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**Water Conservation: A Social Belief**  
**Accounting for the Influence of Attitudes on Water**  
**Abstraction Policy**  
**A Case Study of Mid-Canterbury**

Presented in partial fulfilment of the requirements for the degree of Master of Science in  
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## **Author's Note**

### **(Prologue)**

I became interested in water management late last year when we received a note in our letterbox advising about the installation of a water meter, and the proposed charges. The new charges concerned me because I was on a low student income, I had a fetish for washing my hands, and I did not know how much I would be affected by the charges. This led me to start wondering how effective pricing would be for changing people's water use habits and getting people to conserve.

I was challenged about my own attitudes to water use this year when I shifted to a house with a leaking laundry tap. When I tried to fix the tap believing the problem was only an old washer, I discovered the whole tap was damaged, and a replacement would cost \$58.00. I was not prepared to buy a new tap because I did not own the house, and I felt the cost was too high in relation to my low student income. This created a moral dilemma for me. How could I justify such an obvious waste of water while believing in the principle of conservation and doing a dissertation arguing for water conservation? Did we really need to conserve water? Couldn't I just use less elsewhere? Wasn't that farmer in Lincoln who irrigated in the middle of the day a more wasteful person than me?

Beliefs and attitudes are an important part of what we do. This study explores the influence of beliefs and attitudes on water use in New Zealand.

N.B. See the epilogue to find out how the issue of the dripping tap was addressed.

## Abstract

A combination of variable water resources, increased consumption and lack of anticipatory water abstraction policy has contributed to an increased occurrence of water shortages in New Zealand. Scarce water resources must be conserved for future needs, and there is a current trend in water management favouring the use of pricing mechanisms to reduce existing demand for water. Pricing and property rights mechanisms are believed to be a means of controlling water use, but there is uncertainty over *how effective* they are for changing behaviour. This uncertainty is compounded by a lack of information on the beliefs and attitudes which influence water use. An ethnographic research approach was taken to identify factors which influence beliefs and attitudes to water use, and the case study of mid-Canterbury highlights the ambivalence to water conservation policies. Data obtained from interviews and newspaper articles shows that social and cultural beliefs and attitudes about water use and management may limit the effectiveness of pricing mechanisms to change people's water use. Dominant beliefs about an adequate water supply and an implicit right to use water, combined with attitudes about the individual benefits of water use, outweigh or override normative beliefs about conserving water. Moreover, cultural beliefs that water charges imply resource ownership creates resistance to the use of pricing and property rights mechanisms to achieve water conservation. The lack of strong support for water conservation further reflects the interests of powerful water user groups who have more influence in the policymaking process. Policymakers may need to consider a broader range of policy tools to elicit community support for controls on water use. Addressing beliefs and attitudes is a necessary step to effectively achieving water conservation objectives.

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# Chapter One

## Introduction

### 1.1 The Study Topic

Water conservation is a topical issue in New Zealand at present. In 1992 a power crisis occurred as a result of reduced water levels in hydro storage lakes, highlighting the uncertainty of availability of water resources. The Auckland water crisis in 1994 drew attention to the need to conserve water in situations of drought. In Christchurch, the current installation of water meters and proposals to charge for water use has shown the difficulty with finding a fair way of allocating costs of water use. The issue of conserving water is highly relevant to water managers, who are now obliged under the Resource Management Act 1991 (RMA) to consider the effects of present water use on future generations.

Water is becoming an increasingly scarce resource in some areas of New Zealand. It is ironic that shortages occur in a country with a relatively high level of precipitation. However, the problem with the water supply<sup>1</sup> is that not enough water is available when it is needed. There is increasing demand for water for a range of uses at different times, placing pressure on existing supplies. This increases the risk of adverse ecological effects on the resource, and leads to increased costs for other users. Water shortages in New Zealand may not threaten human survival, but it is imperative that care is taken as to how water resources are used and managed.

On the whole, New Zealanders tend to take water for granted. The provision of water on demand has contributed to economic growth and a reasonable standard of living for most of the population. However, it has also contributed to a perception that there is an unlimited supply of water, which is available for free. Since the early 1900's the government has been responsible for supplying water to meet community needs. Given our dependence on potable (drinkable) water supplies and the limits to supplies and resources, water managers are now faced with

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<sup>1</sup> Supply is referred to as water provided through reticulation systems, groundwater bores, irrigation and stock water races. Resource refers to water in its natural state.



having to consider alternative approaches for meeting demands and dealing with water shortages.

There is a belief amongst water abstraction policymakers that pricing and property rights can achieve water conservation objectives. The concept of water conservation has general public acceptance, as there is a growing awareness of the need to value and protect water resources. Conservation can broadly be defined as: “....[action] which saves something for future use instead of present use” (Herfindahl, 1961:231). However, there are different views on what is the best means for achieving water conservation. Different Maori and Pakeha approaches to water use and management creates uncertainty about how people will respond to price as a conservation policy tool<sup>2</sup>. Little research has been done on how social and cultural beliefs and attitudes influence water use, which raises questions about the appropriateness of using pricing mechanisms in the New Zealand context.

## 1.2 Study Approach

It is the aim of this study to analyse the social and cultural context of water use and management, using the theory of reasoned action (see Appendix 2). The theory of reasoned action is useful for identifying the links between beliefs and attitudes to water use, with water use behaviour. Such a model can help explain the inconsistencies between beliefs in conservation and actual water use and policy approaches. The interaction between water users and managers, their beliefs and attitudes, and water conservation policies is a complex, reflexive process in which the different components are constantly changing in response to each other. Understanding these connections is an important aspect of an integrated approach to water resource management.

In addressing beliefs and attitudes about water use, this study focuses on abstractive uses of water. Abstractive water use includes water being taken out of, or diverted from, water bodies, and includes uses such as stock races and irrigation. One of the purposes of controlling

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<sup>2</sup> The term Pakeha is used to refer to non-Maori New Zealanders, and assumes a worldview typical of modern Western capitalist societies.

abstractive water uses is to protect non-abstractive uses and values such as recreational and food gathering activities, and spiritual, ecological and aesthetic values. Non-abstractive uses and values are threatened by increasing abstractive demands, which are often given priority because of their economic value. This study is based on the belief that abstractive use needs to be controlled, in order to protect water resources, and ecological and tangata whenua values.<sup>3</sup>

Additionally, focussing on issues of abstractive use means that water quality issues have not been addressed. Water quality issues are important because quality can be degraded when quantity is reduced, further threatening ecological and cultural values. However, I have chosen to limit this study to an investigation of quantity issues, from a sociocultural perspective.

In understanding cultural contexts, this study comes from a Pakeha perspective, and therefore provides a limited understanding of the Maori perspective on water use and management.

While the first part of this study addresses water use and management in New Zealand generally, the latter part involves a case study of beliefs and attitudes to water use and management in mid-Canterbury. A case study approach is useful to account for the local physical and political context. The area referred to as mid-Canterbury is intended to generally cover the geographical area of the Waimakariri River catchment. This includes from the Port Hills west inland, and north of the Waimakariri River to the Ashley River. Although groundwater from the Waimakariri catchment also serves areas south of Christchurch such as Lincoln, Prebbleton, Southbridge etc, these areas have not been included. There is no single jurisdictional boundary for water management in the mid-Canterbury area. Rather, it involves the Waimakariri and Selwyn Districts (WDC and SDC) the Christchurch City Council (CCC) and the Canterbury Regional Council (CRC). This study focusses on the CCC and the CRC, as these agencies have formulated water conservation and efficient water use policies respectively.<sup>4</sup>

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<sup>3</sup> Tangata whenua is translated as people of the land, and recognises Maori tribal sovereignty over their resources.

<sup>4</sup> Efficient use of water can be defined as maximising the benefits of using the water while minimising the costs.

### **1.3 Chapter Outline**

The following chapters expand on the case for water conservation outlined in this introduction. Chapter Two provides some background information to highlight the problems with water use and management, and why there is a need for anticipatory conservation policies. Chapter Three explores the use of economic and psychosocial theories to control water use from an integrated management perspective, and identifies the limitations of these theories for informing water conservation policies. Chapter Four outlines the qualitative research process taken to gather information on beliefs and attitudes, in relation to water use in mid-Canterbury. Chapter Five identifies dominant social and cultural beliefs and attitudes about water use and management in mid-Canterbury according to the theory of reasoned action, and how these beliefs and attitudes may affect water conservation policy implementation. Chapter Six discusses the implications of using pricing mechanisms to achieve water conservation policy objectives, and provides some recommendations for how conservation policies might be improved.

## **Chapter Two**

### **The Problem With Water Use and Management**

#### **2.1 Introduction**

Water use and management in New Zealand currently occurs in a context of environmental change. Water is a conditionally renewable resource, made available for human use through natural processes. However, there are limits to the amount available for use, beyond which adverse effects are likely to occur. Increasing demands on water resources are creating new problems for agencies responsible for managing water use. This chapter provides a contextual background to understanding why water abstraction has become a problem in New Zealand. Relevant features of the hydrological cycle and examples of shortages are outlined. Natural and human factors which contribute to shortages, and their subsequent adverse effects, are discussed. The limitations of water abstraction policies for managing scarcity are identified.

#### **2.2 Abundance and Scarcity**

On a world scale, New Zealand has relatively abundant water resources. There is an available water supply of approximately 300,000 litres per day per head of population. Israel and Turkey, however, have 1,500 and 9,000 litres available per day per person (Painter, 1/7/95). While the average Aucklanders uses 180 litres per day, people in Madagascar survive on 5.4 litres a day (Paterson, 1990:130). Such abundance is due to the approximately 300 km<sup>3</sup> a year of fresh water in rivers (Waugh, 1992:1), distributed across a small land mass of 270,000 km<sup>2</sup> and population of only 3.4 million people. Of the total river resource, less than 2 km<sup>3</sup> per year of water is used for domestic, agricultural or industrial use (Dept of Stats, 1989, in Waugh, 1992:1,3).

The availability of water resources through the hydrological cycle (see Appendix 1) has contributed to a common perception of abundant and plentiful supplies amongst New Zealanders (Waugh, 1992:1). Water evaporates from the surrounding oceans and moistens the air, which then moves over the islands and condenses at certain altitudes to form clouds.

Prevailing Westerly winds bring precipitation to the land in the form of rain, hail, fog, snow and frost. The generally steep topography, variable flows and underground filtering and pressure systems of aquifers provides a plentiful yield of high quality river and artesian groundwater supplies (Waugh, 1992:7). Because potable water is naturally produced, the financial costs of pumping and treatment are relatively cheap, and water is reasonably easily accessible for New Zealanders. Auckland consumers, for example, pay half the price that Australians do for having water supplied on demand through reticulated systems (Paterson, 1990:132).

Water plays an important part in the lives of all New Zealanders. Significant volumes of water are used to produce hydro-electricity, which is the main form of energy (Waugh, 1992:1). Surface and groundwater is widely used for irrigation and domestic needs, to support the predominantly agricultural-based economy. Large numbers of the New Zealand population participate in water-based recreational activities such as fishing and jet-boating, and tourist demand for adventure recreation is growing. Water resources are highly valued by tangata whenua as part of their spiritual connection to the natural environment, as a source of food, and a source of individual and tribal identity and status (Taylor & Patrick, Summer 1987:22). There is increasing demand for rivers and their ecosystems to be preserved to protect aesthetic and ecological values, as well as maintaining the benefits of current uses.

Despite plentiful water resources, some areas are facing shortages. Auckland, for example, receives 1185mm of rainfall a year, with rain falling most days (N. Z. Yearbook, 1995:7, Paterson, 1990:132). However, in 1994 a water 'crisis' occurred due to a prolonged period of less than average rainfall in catchment areas, and the city faced running out of water within 10 months. The situation was declared worse than a one-in-100-year-drought, and threatened industry which supported the local economy (Dearnaley, 10/6/94). Residents responded to requests from authorities with a voluntary reduction in water consumption of 25%, but since storage lake and dam levels have been replenished consumption has generally reverted back to previous levels (English, 18/6/94, pers comm, N Cottrell, 13/7/95). Having been advised in

1986 that the city would run out of water by the year 2000, Auckland must either reduce consumption or build a new dam to meet demand.

The Wellington City Council is also having to consider alternative water sources to meet demand. In the early 1980's storage lakes were constructed to defer the time when demand would exceed supply. However, these sources are nearing their current supply capacity. While the full capacity of the Hutt River can be used in times of drought, this will not be possible in the future because minimum residual flows must be left. Smaller sources of additional water are being sought to boost the main supply in times of drought (Wellington City Council, 1994:8-10).

The Nelson area, with a lower rainfall of 990mm and less storage in its aquifers, is also facing supply problems. Increasing demand for forestry and orcharding needs is resulting in shortages in the city area. The Tasman Unitary Authority and the Nelson City Council have set up a water augmentation committee to investigate options such as drilling deeper bores and building an earth dam (N. Z. Yearbook, 1995:7, pers comm, A Fenemor, 3/11/95).

Groundwater supplies in Christchurch appear to be gradually diminishing. Long term hydrographs show that groundwater pressure levels in coastal aquifers have declined over the last 100 years, along with flows in spring-fed streams on the lower plains (Talbot et al, 1986:147,148). The city and surrounding central plains area has a lower average rainfall of 655mm per annum than Auckland or Wellington, and so are heavily dependent on groundwater and groundwater-fed streams for municipal supplies. The Christchurch City Council (CCC) must now restrict groundwater consumption or face the option of piping and treating water from the nearby Waimakariri River at a cost estimated by the CCC of approximately \$100 million (CCC, 24/5/95).

### **2.3 Factors Contributing To Water Shortages\_**

Difficulties arise with water availability because resources are not geographically evenly distributed where they are needed for human use. The West Coast of the South Island, for example, receives 12 metres per annum of precipitation, decreasing considerably as it moves east (Waugh, 1992:1). However, most of the precipitation falls in high country catchments where there is low human settlement. Higher concentrations of populations exist in flatter coastal areas, where the climate is more moderate and conducive to economically productive land use, but water resources are less plentiful (Postel, 1982:9). Such settlement patterns create problems because most major urban centres are sited on flood plains (Waugh, 199:1). Urban areas are prone to incurring costly damage from floods, due to sudden and dramatic rises in river flow from heavy rainfall in the mountainous catchments (Pearson, 1992:96,98).

Seasonal variations in water availability creates problems for meeting demand. Snow and ice melt regulate stream flow, increasing spring and summer flows to meet demand for irrigation, and decreasing flows in winter (Duncan, 1992:16). However, in eastern areas drier summers are experienced due to greater rates of evaporation from increased temperatures. Areas such as Canterbury are prone to situations of drought in late summer and autumn, when soil moisture deficits threaten commercial agricultural production by causing plants to wilt (Knox, 1961:73). At the same time, peak demand occurs for domestic garden watering (Waugh, 1992:8). In summer, reticulation systems and groundwater wells can be hard pressed to cope with the pressure of peak demand.

The variability of New Zealand weather can make it difficult to predict how much water will be available for human use. Although rainfall is spread relatively evenly throughout the year due to a regular cycle of North-West and South-West air fronts crossing the Tasman Sea from Australia approximately weekly, there are significant monthly and annual variations (Talbot et al, 1986:20, Knox, 1961:71). Estimating when floods and droughts will occur requires considerable amounts of information. Records of river flows have only been kept in the last 25

years, and not much is known about the occurrence or properties of droughts (Pearson, 1992:115).

The effect of climate change on water resources creates further uncertainty in predicting availability in different places. There is general agreement amongst scientists that there has been an increase in New Zealand air temperature of approximately one degree Celsius in the past 40 years, and this trend is likely to continue until the end of the century (Cherry, 1989:16, Salinger, 1988 in Larsen, 1989:7). While some suggest there is likely to be little change in total precipitation (Postel, 1989:31), there could be significant variations in water distribution (Waugh, 1992:6). A short term increase in southerly and North-Easterly winds could bring more precipitation, for example, but long term trends are for more North-West winds with more severe and frequent droughts in drier eastern areas (Cherry, 1989:12,16). Warmer temperatures could change the amount of moisture in parts of the hydrological system, with snowpacks melting faster and rivers flooding in Winter, making less available for Summer flows (Waugh, 1992:6). Cherry (1989:17) further states that: "Variability....is likely to increase with the continued global warming".

Changes in land use have an effect on the availability of water resources. Forests generally intercept 20-35% of total rainfall and store the water, which slows the rate of runoff (McConchie, 1992:336). However, New Zealand's economic growth has depended on converting native forest and grassland to pasture. While it is difficult to extrapolate from point measurements to larger soils and catchments, removal of forests can increase the variability of river and stream flows by increasing peak discharges and making low flows smaller and less reliable (Waugh 1992:4, Fahey & Rowe, 1992:265). Additionally, conversion of rural to residential land means an increase in paved area and an increase in stormwater runoff from roofs and streets.<sup>5</sup> Increasing urban areas changes the timing, volume and risk of storm runoff affecting groundwater recharge (McConchie, 1992:335,336).

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<sup>5</sup> New Zealand has approximately 30 times more runoff than is needed to make up the difference when evaporation exceeds rainfall (Eriksen, 1990:51).



There are conflicting views over how much population increase has contributed to increased demand and water shortages. Hayes (1994:266) compared 1964 figures of individual intake with current figures and found them to be similar, implying that increase in consumption is due to increased population as more people are connected to public supplies. However, Keenan (1986:26) argues that population increase plays only a minor contributing factor to growing demand. Wellington Regional Water Board and Council data, for example, shows that water use has increased in both total and per capita consumption (McConchie, 1992:354). Inadequate water supplies have historically been a problem for some urban and rural areas (Talbot et al, 1986:16), but local authorities have been able to meet growing demand by building government-subsidized reservoirs, irrigation schemes and reticulation systems. Installing modern pumping facilities, more wells and bigger pipes as “the ultimate answer to....supply problems for all time....” (McConchie, 1992:352) tends to encourage greater demand overall.

Changes in the way in which water is used has put pressure on available resources. Eighty per cent of domestic consumption is used for either cleaning or to dilute and transport sewage, with toilets using 31 % of domestic water (McConchie, 1992:355). Improved living standards has lead to a rise in domestic consumption. In Wellington, for example, per capita consumption has increased with the sale of automatic washing machines, which use more water than earlier models (Wellington Regional Water Board, 1980, in McConchie, 1992:355). Water used for cleaning or transporting sewage is often high quality potable water. Fitzsimons (12/3/95) states that: “New Zealanders are profligate about water because they perceive it is unlimited”. In the last two decades as pressure on surface water resources has intensified, use of ground water has increased markedly. Although the percentage of water used in different activities varies regionally and nationally , according to climate, attitudes, past experience and availability, irrigation is the major consumptive water use (Waugh 1992:9). Keenan (1986:26) argues that the main reason for increased use is agricultural diversification.

Continued use of water resources at current rates raises the risk of adverse ecological effects. Induced low flows can deplete oxygen levels in rivers and streams, encouraging the growth of

algae and affecting invertebrates and fish (Rooney, 22/3/95). Poor irrigation can lead to leaching of nutrients from the soil, stunting plant growth (Postel, 1989). Reduced groundwater pressure in aquifers can lead to reversed hydraulic movement, and seepage of lower quality surface water from adjacent semi-confined aquifers (Talbot et al, 1986:147). Seawater intrusion occurred in a Nelson unconfined aquifer in 1990 when levels fell below sealevel. Although the aquifer flushed itself clean within two months, abstraction was restricted during this time. Confined aquifers such as the Christchurch coastal ones cannot do this (Fenemor 1992:378). Furthermore, aquifer and land subsidence can occur as a result of excessive abstraction. This is problematic for deeper aquifers which generally have a slower rate of recharge, and which are coming under increasing pressure as shallow aquifer abstraction reaches maximum capacity (Talbot et al, 1986:147).

It is becoming increasingly costly to continue to supply water. Since the 1980's central government subsidies for irrigation and reticulation systems have been removed, in order to encourage more efficient local and regional government (Buhrs & Bartlett, 1993). Territorial councils, for instance, must now find the revenue to provide potable water supplies and maintain or replace ageing and undersized pipes. In Auckland, for example, nearly a quarter of the water supplied is lost in leaks (Paterson, 1990:132). Additionally, individual farmers must now finance their own irrigation needs, and the efficiency of irrigation methods depends on the maintenance of equipment and how it is used (Postel, 1989).

Further demand is likely to lead to increased conflict over scarce resources between competing interest groups. In Christchurch, for example, there has already been instances of reduced flows between bores located too close together, creating conflict between bore abstracters (Canterbury Regional Council, 1991). Tangata whenua needs for protection of waterbodies with important ancestral value must now be recognised and provided for, according to the principles of the Treaty of Waitangi. Additionally, since the 1950's, there has been growing concern amongst fisher people and conservationists over the need for clean waterbodies to protect species habitat (Eriksen, 1990:58). The implication of protecting ecological and tangata

whenua values is that there will be less water available for abstractive uses. Although domestic and stock needs have priority to water supplies, conflict between tangata whenua needs, water conservation interest groups and farmers needing to irrigate is likely to increase (Waugh, 1992:9).

#### **2.4 The Need for Anticipatory Water Conservation Policy**

Provision was made in the Water and Soil Conservation Act 1967 (WSCA) to plan for allocating scarce water resources. The National Water and Soil Conservation Authority (NWSCA) was appointed as a policy and advisory unit, to encourage the formulation of water and soil management plans at the regional level (Eriksen, 1990, Russ, 1987). Regional Water Boards had the function of issuing water rights for purposes other than domestic, stock and firefighting uses, on the criteria that abstraction would be for beneficial use (Fenemor, 1992:366). In conjunction with Catchment Boards formed under the Soil Conservation and Rivers Control Act 1941, Regional Water Boards could make bylaws, set maximum and minimum flows on water bodies under heavy demand, and implement restrictions on water use (Russ, 1987:38, Eriksen, 1990:66).

Despite the WSCA's provisions, other features of the Act have contributed to a lack of anticipatory water conservation policy. The Act's objective of multiple use implied that no use should forestall another use (Eriksen, 1990:67).<sup>6</sup> Consequently, many Maori felt that their interests were not given "sufficient weight within the multiple use framework" (Taylor & Patrick, 1987:22). The criteria for water rights of beneficial use was inadequate for managers to prioritise allocation in situations of scarcity, since it could be interpreted as including most uses. Individual allocation on a case-by-case basis was problematic for controlling water use, because individual allocation had to be considered in the context of the wider public interest, and the NWSCA did not have a policy on what was in the best public interest (Russ, 1987:39, Eriksen, 1990:66). There were no procedures in the Act for forming water conservation plans, or for identifying and involving a range of interest groups. Because water management plans

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<sup>6</sup> The objective of multiple use was intended to help balance competing abstraction and protection demands on water resources, in the best public interest (Russ, 1987).

were not mandatory, those that were formed were not legally binding on Regional Water Boards, as district schemes were for territorial local authorities (Fenemor, 1992:366).

Water abstraction policy has largely focussed on responding to catchment management issues of flooding, soil erosion and water quality. The focus on catchment management through physical works rather than planning has been attributed to the Ministry of Works and Development having more power and resources than Regional Water Boards. The Ministry had authority to give approval to development proposals, allocate funding for catchment works, and was represented on catchment boards by physical scientists and engineering staff. Few water management plans were completed due to the high cost of preparing them, since the WSCA made no provision for Regional Water Boards to collect rates to pay for water planning (Eriksen, 1990:62,63,69,75). Planning only occurred for large-scale development, in response to immediate catchment problems or where existing conflict over water use had elicited funds (Newson, 1992:129).

The Town and Country Planning Act 1977 (TCPA) also reflected an emphasis on land use rather than water abstraction planning. Under the TCPA, regional planning schemes were a mandatory requirement, and had to provide information on drainage, sewerage, water supply and public works. District schemes similarly had to make provision to avoid flooding and subsidence, but territorial local authorities were resistant to supporting regional planning schemes because regional control posed a threat to municipal authority and power (Russ, 1987:39,81). Drainage and soil conservation to protect land use and get rid of excess water reflects an emphasis on the problem of too much water. The problem of excess water was furthermore accelerated, and constrained by, intensive pastoral production and urban growth (Fenemor, 1992:365).

Changes in legislation since the late 1980's reflect a shift towards more sustainable and integrated management of water use. The RMA, which has repealed the WSCA and the TCPA, reflects growing recognition of the need to actively protect and conserve water resources.

Moreover, the Local Government Act 1989 (LGA) was instigated to achieve more effective government at the local level. Under these pieces of legislation, many smaller local authorities such as catchment boards, regional water boards and drainage boards have been amalgamated into regional and district or territorial councils, with more responsibility and functions being devolved from the national level. Regional councils are now responsible for planning and allocation of permits to abstract. Territorial authorities have jurisdiction over municipal water supplies, and their policies and plans must be consistent with the regional councils policies.

Under the RMA, sustainable management implies a long term allocation regime in which use and protection of water resources is balanced to meet the needs of future generations. Regional water management plans are now legally binding on regional and territorial councils. Water consent applicants must prove their abstraction is an efficient use of water. Greater provision is made for protecting the rights and values of tangata whenua to their water resources, through consultation on plans and resource consents. Fenemor & Markham (1994:277) state that: "Because the RMA gives greater protection to ecological values than did the WSCA, there is now a greater responsibility on councils to define these values and their sensitivity to flow".

Changes in the legal framework represent only incremental improvements for allocating scarce water resources. The ambiguity of the term 'while' in the RMA does not resolve the problem of how to balance water use and preservation in order to achieve sustainability of resources (Fisher, 1991). Regional water management plans are not mandatory, implying they are only needed when there is a problem with water abstraction. With water resources "....there is no sudden loss of instream values as flows decrease...." (Fenemor & Markham, 1994:277). It is difficult to prove that individual abstractions have an adverse effect on water resources. Protection of existing users rights is problematic for future water users, as existing users are likely to influence the formation of plans, and they are unlikely to represent the interests of future generations (Fenemor, 1992:367). There are no legal requirements to set minimum flows, and no guidelines as to what percentage of flow they should be set at. Councils may lack the hydrological database and expertise necessary to do anticipatory planning of allocation.

Setting limits in anticipation of future scarcity is difficult to justify if there are present adequate resources.

So far, mechanisms typically used for controlling water abstraction represent a reactionary approach to shortages. Restrictions have mostly been in the form of bans on garden watering, use of outdoor hoses and swimming pools, with fines for non-compliance (Paterson, 1990:132). Water conservation measures have been accompanied by sporadic publicity using promotional figures such as Robert D Frogg used in Auckland (Hayes, 1994:267). Other voluntary mechanisms tried by municipal authorities have included, for example, issuing free tap washers in Dunedin and lead weights for toilet cisterns in Christchurch (Hayes, 1994:267). Regulatory and voluntary methods for controlling water use are usually only applied once a drought or shortage has occurred. Voluntary restrictions have a high level of non-compliance and are difficult to enforce. Postel (1984:46) states that: “municipal conservation is still typically viewed only as a means of combatting drought, rarely as a longrange water strategy”.

## **2.5 Summary**

Water resources as we know them today are a result of the complex interaction of climatic and geological processes, and human modification of the natural environment over time. The variability of the New Zealand climate and patterns of water use have contributed to mixed perceptions and experiences of abundance and scarcity regarding water resources. Although there is a high level of uncertainty over the precise cause of water shortages, adverse effects are likely to occur if current water use patterns continue. Since there are limits to the availability of water, water use must be controlled and resources actively protected in order to meet future water needs. The lack of adequate water conservation policy so far raises questions about how effective traditional policy methods will be for managing increasing demand for water in the long term. The following chapter explores the use of pricing mechanisms as an alternative policy tool to managing water use.

## **Chapter Three**

### **Proposed Management Solutions To The Water Use Problem**

#### **3.1 Introduction**

The complexity of the water abstraction problem requires a new approach to managing increasing demand. Economic theories about human behaviour partially explain how water use can be influenced. An integrated management approach requires consideration of a broader range of theoretical models to help understand factors which influence water use behaviour. Ajzen and Fishbein's psychosocial model of reasoned action is helpful for understanding how social and cultural aspects have a significant effect on water use. These factors must be taken into account when forming water conservation policies. This chapter provides some background to the use of economic instruments for controlling water use in New Zealand and overseas. The strengths and weaknesses of the theory of reasoned action as a means for explaining and predicting water use behaviour are discussed. Social and cultural influences on water use and management are outlined.

#### **3.2 Economic Instruments As Policy Tools**

There is a trend in New Zealand towards the use of pricing mechanisms as a means of achieving water conservation objectives. The RMA allows regional and territorial local authorities to use a range of pricing instruments including financial contributions, administrative charges, bonds, incentives and transferable or tradeable permits to achieve sustainable management of water resources (Fenemor, 1993:2,3). The Ministry for the Environment (MFE) advocates the use of economic instruments as least cost policy tools which will allow New Zealanders the freedom to express their individual preferences and make tradeoffs regarding environmental use and protection.<sup>7</sup> The national environmental policy for the next 15 years, 'Environment 2010 Strategy', has an agenda of using effective policy tools within the legal framework which "will work with market forces and encourage cooperation by businesses and individuals" (MFE, 1994:8).

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<sup>7</sup> MFE has replaced the NWSCA.

Interest in pricing mechanisms for managing water use stems from an international dissatisfaction with regulations for achieving environmental protection. Regulations, in the form of written rules, are known as command and control mechanisms because they tell people what they can and cannot do, and require the coercive power of the state to legitimise and enforce them (Gow, 1993:1). The use of regulations for implementing water abstraction policies is becoming increasingly costly for governments, as constant updating makes regulations confusing for the public, and can produce conflicting incentives and high administration costs. Furthermore, regulations do not provide an incentive for innovative conservation technology (Sharp, 1993:1). While there will always be a need for some regulations to provide a framework for the use of other policy tools, pricing mechanisms are seen as more cost-effective, efficient and flexible, and provide a powerful complement to regulations (OECD, 1991:1).

Pricing mechanisms can be a useful tool for policymakers in market economies to influence people's water use (Gow, 1993). Price "affects the costs and benefits of alternative action open to economic agents, influencing their behaviour in ways which are favourable to the environment" (OECD, 1991:10). Charging for water in a market economy can be an efficient way of managing transactions where there are a lot of consumers and firms wanting to use a lot of water (Hjalte, 1977:4). When the supply or quantity of water available is reduced, the price can be set to reflect the increase in value of the water due to its new condition of scarcity, which include the costs of overusing the resource. As the price increases, the demand for the good becomes less, since fewer people are willing to pay the higher price. There are a range of pricing structures which can be used to generate information on costs and supplies, reduce transaction costs, provide incentives for conservation and act as a source of revenue (OECD, 1991:13). Moreover, price as a monetary value is a universally recognised measuring unit which is already applied to many other goods and services in market economies (Hjalte, 1977).



The basis for using economic instruments to allocate scarce water resources is a belief that pricing will change individual water use, to achieve conservation objectives. Classical economic theories hold that people will respond to the increased cost of water on the belief that if they use less water or do more with what they use, the financial cost will be lower for themselves. Charging for water will provide an incentive for people to take measures to change their consumption, for instance, by fixing leaking pipes or dripping taps. The public will respond to water charging because it is a fairer way of distributing the costs of water use, commonly referred to as a 'user-pays' system (Christchurch City Council, 1995:3). Charging for costs of managing water use and abstraction has the capacity to raise awareness of the value of high quality water, decrease overall consumption and conserve the resource (Eriksen, 1990:68).

Although according to the Organisation for Economic Co-Operation and Development (OECD) an increasing number of countries are using pricing mechanisms (1991:9), there have so far been varying results with their use in managing water abstraction. In England, for example, privatisation of the water industry to meet European Commission standards has increased water prices 25% above the inflation rate, due to heavy capital investment and leakage problems (Bramley, 1994:78). Despite this increase, Britain is still facing shortages, and experiments with water meters to reduce use by 10% have proved uneconomical because of high installation costs (Economist, 1991:53,54). In New Zealand, there have been mixed experiences with using pricing mechanisms to reduce consumption. Waitakere City has achieved a consistent drop in water consumption since 1990, believed to be due to the introduction of a lower fixed rate water charge separate from property rates (pers comm, R Taylor, 31/10/95). However, in Omaha, Auckland, the community rejected the proposal of a tradeable water permit system by the regional council to control groundwater use, on the basis that it would create divisions in the small community, increase costs, locals would lose the involvement they had over allocation, and profits would go outside the area (Yates & Daly, 1994:286,287). In Nelson, the Tasman District Council found that a flat rate charging system resulted in increased consumption, while a fixed charge resulted in 25% less consumption (Mathias, Press, 23/8/95).

Economic models only explain part of an individual's choices regarding water use. Classical economic theory is based on the ideas of Adam Smith, who viewed individuals as rational self-maximisers. He believed that personal morality would guide individual choices, which would result in the best outcomes for society (Grant, 1991:39). Smith prescribed the rational, competitive human and the capitalist market as the means to alleviate the social ills of the time (Schwartz, 1986:43). However, what Smith advocated as prescriptive has been interpreted as *describing* human nature. Smith's concept of 'economic man' was combined with Social Darwinism notions of humans as being naturally individualistic, competitive and selfish, and Hobbesian ideas about the need for control and power to be given to a central authority to correct individual behaviour (Schwartz, 1986:47). While this may be a valid explanation of some individual consumptive behaviours, it reflects only one aspect of total behaviour, and does not account for social choices about water use.

### **3.3 An Integrated Environmental Management Approach**

An integrated environmental management approach takes a broader view of the context in which individual water use occurs. Societies are made up of social, cultural, political and economic subsystems, which are structured in such a way to influence individual water use (Muller, 1982:19). Such systems consist of interactions between individuals, which produces common beliefs, attitudes, and "phenomena of power, socialisation and stratification" (Cuff & Payne, 1984:185). Water abstraction policies are not formed outside of these interactions, but policymakers draw on common beliefs about water resources and people when managing water use. Understanding a range of beliefs and attitudes which influence water users and managers is critical for effective policymaking (Muller, 1982:21). Buhrs (1995:6,15) states that: "Environmental problems are more likely to be effectively addressed if they are defined in a way which takes into account the diversity in possible interpretations and explanations....as to what 'the problem' is and how it could or should be addressed".

Individual water use is more complex than economic models suggest. For example, people appear to be strongly influenced by what others think of their behaviour, or what others are doing to conserve water. A U.S. study compared self-reported water use with actual consumption registered on water meters (Hamilton, 1985:319). Results show that the accuracy of self-reporting was low because people were not aware of their water consumption and were reluctant to admit to increasing use during a shortage. Another study done amongst students at a U.S. campus recreational facility highlighted the point that drawing people's attention to inconsistencies between publicly expressed attitudes to water conservation and actual water use resulted in shorter showers being taken. This approach was effective in changing the behaviour of people who did not want to publicly appear hypocritical (Dickerson et al, 1992:841). Although these studies were isolated within artificially created settings, they identify a high level of avoidance of socially undesirable responses which can influence water use. Additionally, research shows that water users associated with environmental groups and those of a higher income and education level are more likely to have a greater correlation between conservation attitudes and behaviour (Hines et al, 1986/87).

Psychosocial theories are useful for explaining how beliefs and attitudes influence water use behaviour. Ajzen and Fishbein's theory of reasoned action (1980, see Appendix 2) proposes that people generally act rationally on the basis of information available to them. Human behaviour can be predicted by understanding the beliefs and attitudes about water use, as these influence intentions to act, and intentions are a good indicator of actual behaviour. In relation to environmental behaviour, Ajzen and Fishbein's model is supported by Hines et al (1987), who identified variables such as knowledge of issues and action strategies, an individual's sense of responsibility or citizen duty, and ability to take action as key influences on environmental behaviour. Intentions appear to be a good indicator of actual behaviour because inconsistencies and contradictions in attitude and behaviour create an uncomfortable sense of cognitive dissonance (Kantola et al, 1983:164).

There are limits to the theory of reasoned action for informing water abstraction policy. There is no adequate way of assessing individuals weighting of beliefs and attitudes (Ajzen & Fishbein, 1980). For example, reduced water consumption may be a result of economic downturn rather than a response to specific water conservation policy. Since there are a number of external variables which influence beliefs, and a range of beliefs which influence attitudes, changing one or two beliefs may have little effect on changing attitudes to water use. Changing attitudes may not lead to a change in behaviour if the intention is not strong. In addition, the range of influences on beliefs and attitudes limits the models' ability to accurately predict responses to policy instruments. Hines et al (1987:7,8) suggest that situational factors can intercept between a person's intentions and their actual behaviour: "the operation of everchanging situational factors demonstrate the uncertainty involved in the prediction of environmental behaviour". If managers can identify key variables which have a strong influence on beliefs and attitudes, policymakers may be able to better select effective policy tools to change water use behaviour.

Assumption of humans as rational agents is problematic in relation to framing water conservation policies. People do not necessarily "think, feel or behave according to any model of rationality" (Buhrs, 1995:16). It is not rational, for example, to continue to use resources in such a way that could ultimately destroy the natural environment on which humans are dependent for their survival. Nevertheless, the use of reason and logic has been highly valued to resolve major social problems; "such a way of thinking was supposed to be superior to any that had preceeded it because it was more 'natural' to humans" (Worster, 1988:11). Belief in human rationality is rooted in Baconian scientific thinking, which is further reflected in a Western worldview that humans are separate from nature and have the superior ability to modify our natural environment (Passmore, 1974, Van Liere & Dunlap, 1983). Such cultural contexts have an important influence on beliefs about water use and management, which must be understood by policymakers.

### 3.4 The Social And Cultural Context Of Water Use and Management

Individual's beliefs and attitudes regarding water use and management are influenced by a range of social and cultural factors. Giddens (1993:31,32) defines culture as:

the values members of a given group hold, the norms they follow, and the material goods they create", and society as "a system of interrelationships which connects individuals together.

Prevailing Western values have influenced New Zealand water and land use and management: "The way we own, control and use our resources is an important part of our national identity" (Wright, 1988:127). The emphasis on ownership of resources within Pakeha social structures contrasts markedly with values of indigenous groups such as Maori, who see their relationship with land and water as belonging to the natural environment (Wright, 1988:119). Understanding the influence of such values on water use cannot be underestimated:

ultimately the relationship between people and their environment is founded on certain beliefs which may not be explicitly articulated, but which are outcomes of the relationship (Frawley, 1992:218).

Political institutions in which water abstraction policies are formed tend to reflect the beliefs of more powerful business and private sector groups (Buhrs, 1995:10). There is a common belief, for example, that problems with common property resources such as water have arisen because the resource is shared by competing individuals who do not have any incentive to internalise their action. The state of water as common property should be abandoned, and replaced with private ownership rights, as these rights give individuals a vested interest in not ruining the resource (Hardin, 1968:384,385). Allocating private property rights to water resources has some advantages for distributing costs of using scarce resources. Property rights come into being because a dispute arises between potential users and forces decisionmakers to make rules to allow business to proceed equitable and efficiently (McEvoy, in Worster, 1988).

Modern philosophies about the self-maximising 'economic man' have formed what is known as a dominant social paradigm which has influenced policymaking in general (Buhrs, 1993:68).

Dominant beliefs about pricing and property rights may not be an appropriate basis for forming water abstraction policies. For instance, there are problems with applying private property rights to water resources. Water is fluid, so boundaries of rights and responsibility are harder to define. Effects of overabstraction spread according to natural hydrological forces, and do not remain within private property or jurisdictional boundaries (Hjalte, 1977). Furthermore, ownership is a right declared by the community, which helps to define what is socially acceptable behaviour in terms of resource use (Round, 1994). In situations of scarcity, economic theory does not say which competing rights should be protected.<sup>8</sup> Rights to water use should therefore be subject to restrictions through a form of social and political control, where competing claims can be scrutinized to see whether they are consistent with socially articulated goals and objectives (Bromley, 1987).

Water abstraction policies based on pricing and property rights may or may not influence water use. Whether price achieves the desired environmental outcomes depends on how it is implemented, by whom, under what circumstances and for what purpose (Buhrs, 1995:10). For instance, there may be inadequate incentives to change water use and conserve if the price of water does not reflect the social costs of effects on others or the environment (Wheeler, 1993:5). 'Free-riders' will benefit from the actions of those conserving, and the costs of overuse by some will be borne by all water consumers. Additionally, charging may result in increased consumption, if people think they can use as much as they want since they are paying for it. Price based on information obtained from water metering or trading of permits may not reflect willingness to pay but ability to pay (Yates & Daly, 1994:287). Hjalte (1977) argues

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<sup>8</sup> Bromley (1987:11,12) says there are two types of property rights: status quo rights which is: 'I must pay to prevent you infringing my rights, and alternative rights which is: 'you must pay compensation to infringe my rights'. Status quo rights are ill-suited because: "... (it) simply represents what is in place at the moment a dispute arises; it may be the result of conscious design based on prior preferences, or it may simply be by default because a particular dispute has never arisen". Status quo rights do not protect future users; alternative rights gives future users rights and present users duties.

that: “as all consumers would prefer to be ‘free-riders’, some basis for decision-making other than that of the decentralized free market must be found”.

Water abstraction policymakers need to consider the social and cultural context of water use when choosing policy instruments. Round (1994:452) states that: “....rights to do as one pleases with one’s own property must be limited simply in order to protect other people and their property”. It is the state which ultimately decides which policy instruments to use to achieve water abstraction objectives. Therefore, policymakers need to be informed about beliefs and attitudes to water use, and how people will respond to pricing and property rights mechanisms.

### **3.5 Summary**

New situations of scarcity with water resources requires alternative policy tools to be used in water abstraction policy. However, the model of ‘economic man’ as a basis for using pricing and property rights to manage demand is a simplified view of human behaviour. Water use behaviour is more complex and requires a broader range of theoretical perspectives to account for the influences on water use. Despite its limitations, the theory of reasoned action is useful for explaining the links between beliefs and attitudes about water use and management. Western social and cultural beliefs have influenced the preference for pricing as a policy tool in water abstraction management. There is uncertainty over how appropriate pricing and property rights are in the New Zealand context. Further information is needed in order to understand how contextual factors influence water use and policies. The following chapter outlines a method for collecting and using information on beliefs and attitudes, to aid policy tool selection.

## **Chapter Four**

### **A Case Study of Mid-Canterbury Water Use and Management**

#### **4.1 Introduction**

A qualitative research approach may be able to determine some of the sociocultural factors influencing beliefs, attitudes and water use behaviour. Qualitative research differs from quantitative research in that it explores data in the form of words rather than numbers. Data is typically reduced to themes or patterns and interpreted subjectively. An ethnographic case study provides an example of how a qualitative research method can be used to improve water abstraction policies. This chapter looks at the usefulness of such a method for identifying factors which influence beliefs, attitudes and water use behaviour. The case study of water use and management in mid-Canterbury is outlined, followed by the research process which was taken to gather the necessary qualitative data. Limitations of the case study are identified.

#### **4.2 The Research Method**

Ethnographic research is concerned with:

....capturing, interpreting, and explaining the way in which people in a group, organization, community, or society, live, experience, and make sense out of their lives, their world, and their society or group (HOD, 1990, in Rudestam & Newton, 1992:35).

A case study provides a holistic view of the context in which such social interaction occurs (Finch, 1986:159, Sarantakos, 1993:265). Gathering data on the subjective values and meanings of water use and management offers an understanding of the links between beliefs, attitudes and behaviour, and abstraction policies within a sociocultural context. Interviewing is a key instrument for gathering information on beliefs, attitudes and behaviour. Semi-structured interviews allow researchers the flexibility to further probe behind beliefs and attitudes expressed in response to interview questions, and gather information which might not be



elicited in a survey. Face-to-face interviewing can provide an impression of what people mean in their statements by observing their responses. Because interviews usually occur in the participants 'natural setting', it is possible to get a feel for the interviewees situation and see the world from their perspective (Finch, 1986).

Ethnographic research fills an important knowledge gap in mid-Canterbury as there has been no research done on beliefs and attitudes underlying water use, to inform water abstraction policies. The Canterbury Regional Council has general information on allocation, but little useage information on private bore or surface water abstracters (CRC, 1992:7). The Christchurch City Council has statistics on household consumption and some descriptive information on numbers of adults and children per household, time spent watering the garden and the number of showers and loads of laundry done, but no information on motivations for water use or feelings about the appropriateness of regulations on water use (CCC, 24/5/95). Finch (1986) argues that this type of information reflects a bias amongst government agencies towards scientific, empirical quantitative data to inform policies, because it is perceived as objective, value-free and politically neutral. Statistical information on water use and allocation is not value-free, but must be interpreted by policymakers according to beliefs and theories about people and their environment. A lack of accounting of beliefs and attitudes may have contributed to problems with implementing water abstraction policies in the mid-Canterbury area.

### **4.3 The Mid-Canterbury Context**

The mid-Canterbury context of water use and management provides a useful example of the need for water conservation policies. The mid-Canterbury area is a semi-arid environment, with warmer, drier North-West winds predominating in spring and summer, contributing to increased air temperatures and causing soil moisture levels to drop (Talbot et al, 1986:17). Water resources for abstractive uses are available from the Waimakariri River, and inland and coastal aquifers recharged by the river and rainfall on the plains (see Appendix 3). However, a prolonged period of drought in 1988/89 threatened the local economy and highlighted the need

for more agricultural irrigation to prevent crop damage and topsoil loss from wind erosion (Talbot et al, 1986:25). In addition, the main urban centre of Christchurch has expanded westward, encroaching onto farmland, and putting increasing pressure on groundwater supplies for agricultural and domestic use. Although Christchurch users have paid the lowest costs in New Zealand for municipal water supplies, this situation is now changing.

Ajzen and Fishbein's theory is helpful for identifying beliefs and attitudes underlying water users and managers responses to water conservation. The Christchurch City Council has been installing water meters since 1991, and is currently proposing a capital value-based pricing policy to charge reticulated supply consumers for excess water used above an annual allowance of 286 cubic metres.<sup>9</sup> The charging policy is based on the belief that this will encourage conservation, reduce costs of supply and fairly distribute charges (Mathias, 2/2/95, CCC, 24/5/95:2,17). There has been a mixed response of support and resistance to the policy from both the public and city councillors. On the basis of the beliefs and attitudes expressed in letters to local newspapers and submissions which generally opposed the notified policy, it is questionable whether the proposed charging regime will achieve its conservation objective of a 20% reduction in water consumption.

There are concerns about the effects of charging on industrial and commercial water users. Industrial primary processing activities are an important part of the infrastructure for agricultural production, providing jobs and contributing to the local economy. Additionally, tourism and associated hospitality and commercial services are becoming an increasing contributor to the local economy in terms of income and employment (Lim, 1991:63,85). The City Council cannot afford to lose the custom of industrial and commercial water users, whose financial contribution is important to the maintenance of the reticulation system (CCC, 24/5/95), but private bore users within the Christchurch City area are competing for the same water as the

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<sup>9</sup> The fixed charge for the 286 cubic metre allowance is based on the capital value of the property. The relationship between property value and the amount of water used is tenuous, and may have been valid in the past when high property values were associated with larger sections and bigger gardens. However, a trend towards infill housing in urban Christchurch means high capital values are being paid in some suburbs for smaller sized properties with little or no garden.

CCC. Furthermore, some industrial and commercial water users have their own private bore, while others use the CCC's reticulated supply (pers comm, D Scott, 21/11/95). There is concern that increased water charges will deter business and development from the area (Press, 7/2/95), and lead to more reticulated users switching to private bores.

Further concern has been expressed about the effect of water charging on domestic users. Opposition to the proposed capital value-based charging policy is mostly based on equity grounds, that water charges unfairly discriminate against families, those living in areas with sandy soils, and those on fixed or low incomes whose property value has increased, while favouring those in cross-lease properties who do not have to pay for extra water used over the 286cum annual limit (CCC, February 1995, Press, 11/8/95, ChCh Mail, 27/7/95). In addition, there is concern that charging for water may have an adverse effect on the 'Garden City' image. Gardening is a popular recreational pastime for many people of mid-Canterbury, and Christchurch City has an image as 'the Garden City' which helps to attract tourists.<sup>10</sup> However, irrigation of domestic gardens has been identified as the main contributor to peak demand in the spring and summer months (Espiner, ChCh Mail, 2/2/95). Fears are held by some that reduced garden watering as a result of increased charges could lead to Christchurch becoming 'brown town' (Press, 3/3/95). This has implications for the city's attractiveness to tourists, and for low income earners' ability to grow their own food (Press, 25/2/95).

In addition to the CCC's charging policy, the CRC supports the use of pricing and property rights to manage competing demand on scarce water resources. The Council's Regional Policy Statement (RPS), for example, proposes a number of policies and methods for allocating scarce water resources. However, the RPS gives little clear direction for how the Council will manage demand for water resources above the minimum flows set on the Waimakariri River and on groundwater levels. Few restrictions on bore allocation have been imposed (CCC, 24/5/95). Despite being required by the Planning Tribunal in 1991 to place restrictions on groundwater

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<sup>10</sup> Gardening reflects the historical English roots of Pakeha culture. Eldred-Grigg (1982) makes the point that decorative household gardens and lawns became fashionable amongst working class settlers in order to try and emulate the wealthy British estate gardens.

abstraction in the overallocated Christchurch-West Melton area, the Christchurch-West Melton groundwater management plan is not yet operative. The management plan for the Waimakariri River and Catchment area has been written but has not yet been publicly notified (pers comm, M Dicker, 7/7/95, C Mason, 17/11/95).

There appears to be some ambivalence amongst councils about the need for water conservation. Since the 1980's there has been a trend to more water intensive and diverse horticultural and dairy production, which the CRC has responded to by ongoing allocation of permits to irrigate (Newell, 1985, pers comm, T Davoren, 20/7/95).<sup>11</sup> However, there is also a trend towards rural subdivision of smaller lifestyle blocks and hobby farming (Gee, Press, 22/2/95). Increasing rural populations are a boost for struggling rural communities, but intensive farming must now compete with hobby farming and rural residential needs for the same groundwater supplies. The Waimakariri District Council (WDC) is presently not considering adopting a pricing policy to control water consumption, despite the Council having the fourth fastest population growth rate in New Zealand (pers comm, I Davies, 24/5/95, L Woudberg, 17/7/95, Espiner, ChCh Mail, 6/2/95). Increasing demand for water and land in rural areas poses potential allocation problems for the CRC.

Ngai Tahu are seeking to have their customary authority over their water resources recognised and provided for by the CRC, in line with requirements under the RMA. The Waimakariri River, coastal wetlands and natural springs have important cultural and social value to Ngai Tahu members, and the iwi want wetlands to be protected, river flows to be maintained and enhanced, and further involvement in planning and consent decisions (Tau et al, 1990:4-20,4-21). The CRC has set a minimum low flow on the Waimakariri River of 37 cumecs to protect the resource, and below this irrigators must cease to abstract (pers comm, C Mason, 17/11/95). As well as the possible future option of diverting river water to enhance CCC municipal supplies, the WDC has also applied to the CRC to divert 5 cumecs from the Waimakariri River.

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<sup>11</sup> The increase in demand for irrigation in mid-Canterbury is believed to be due to international market demand for dairy and horticultural products and the fact that land is cheaper in Canterbury than in Waikato, a traditional North Island dairying region (pers comm, T Davoren, 20/7/95, R Winchester, May 1995).

This is intended to recharge the Ashley-Cust Rivers which are prone to drying out, but the diverted water would also be used to support irrigation needs. The CRC has made provision for the diversion in the Waimakariri River and Catchment Management Plan, but does not plan to restore any wetlands (C Mason, 17/11/95).<sup>12</sup> While local hapu have been consulted over preparation of the management plan and the proposed diversion, Ngai Tahu interests in water resources are competing with other demands from water users. The ambivalence amongst water users and managers towards controlling water use can be further explored by identifying beliefs and attitudes about water use.

#### **4.4 The Process for Gathering Information on Beliefs and Attitudes**

A random sample of representatives from various water user and management groups was selected to gain an understanding of factors influencing attitudes and behaviours (see Appendix 4). Individuals were chosen from the telephone book or by word of mouth, the main criteria being that they were willing to participate and were not previously known to the researcher. The cases were intended to represent a typology of domestic, industrial, commercial, and irrigation users, and regional, district and tangata whenua management perspectives (Sarantakos, 1993:261). Distinctions between the categories are somewhat artificial in the sense that there is overlap between the different groups. Hotels, for example, are considered commercial water users, but the water is used to meet the domestic needs of patrons. Notwithstanding this, formal definitions of categories and size of sample is not a major problem with qualitative research because it is not intended to provide rigid empirical measurement (Dooley, 1984). The purpose of the sample selection was to gather a range of views to build up a picture of the social and cultural context of water use and management in the mid-Canterbury area.

Data on beliefs, attitudes and behaviour were collected from semi-structured, single interviews based on a standard set of questions (see Appendix 4). The questions were worded in an open-ended manner to avoid 'yes' and 'no' responses, and followed a logical sequence of

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<sup>12</sup> The WDC proposed diversion includes channelling diverted water through a wetland to settle out sediment (pers comm, C Mason, 17/11/95).

identifying beliefs, attitudes, intentions, behaviour and outcomes in relation to future water shortages. 'Water conservation' was not included in the wording of the questions for two reasons. Firstly, it may have elicited a response perceived to be acceptable to the researcher, and thus bias the information sought. Secondly, water conservation may be associated by participants with the Christchurch City Councils policy. While the pricing policy may be important to ratepayers in the urban area, it is the links between the policies, socio-cultural factors and their influence on attitudes and behaviour which are the focus of this study. The assumption that there will be future water shortages reflects the researchers own views and goals of the study, that is, to improve policies which promote water conservation (Rudestam & Newton, 1992:37,38). Qualitative research does not pretend to be value free, but acknowledges the political nature of social research (Finch, 1986).

The data was summarized, coded and analysed according to variables of beliefs, attitudes, intentions and behaviour of each category of water users and managers (see Appendix 5). Since the research did not start with a hypothesis regarding beliefs and attitudes about water use, but was based on a question about what influences water use, the research can be described as exploratory rather than hypothesis testing (Dooley, 1984). Key patterns and themes were identified by methods such as clustering common views and concepts (Sarantakos, 1993:308,309, Rudestam & Newton, 1992:36). It is difficult to distinguish beliefs from attitudes in some cases because they connect and overlap, and the interactions through which they are influenced means they are in a process of change over time. However, the sequence of variable interaction outlined in Ajzen and Fishbein's theory (Appendix 2) was useful for identifying a logical chain of evidence. The findings of the interviews, as well as relevant views expressed in written documents and newspaper articles, have been analysed according to the sociocultural context of water use and management in mid-Canterbury.

#### **4.5 Limitations of the Case Study**

There are some limitations with using the theory of reasoned action in this particular case study which must be acknowledged. The study does not address demographic, emotional or

personality factors which can influence individual beliefs and attitudes about water use, but focusses on social and cultural beliefs and attitudes which are likely to influence water use (Ajzen & Fishbein, 1980). The relatively small number of participants interviewed means that the beliefs, attitudes and behaviours identified may be unique to these individuals. Similarly, there may be beliefs and attitudes about water use which have not been identified. The information given may be further constrained if it is commercially or politically sensitive (Finch, 1986:208). These factors, combined with the particular features of the context, limit the extent to which findings can be generalized for the whole New Zealand population. Nevertheless, a similar methodological approach could be replicated in another setting using the same categories of water users and managers, to provide vital information for improving regional and territorial water abstraction policies (Rudestam & Newton, 1992:38).

#### **4.6 Summary**

Policymakers may have difficulty implementing policies to control water use if they are based on a lack of information about what motivates water use. Data on water use and abstraction has traditionally been of a technical nature, in relation to engineering information needs for managing the supply. However, the case study of water use and management in mid-Canterbury shows that water use is increasingly a social problem, requiring an understanding of the social and cultural context in which water use problems occur. Piecing together the data according to the theory of reasoned action helps to provide an impression of the context of ambivalence to water conservation policies. The following chapter outlines the context of dominant social and cultural beliefs and attitudes to water use.

## **Chapter Five**

### **The Social and Cultural Context of Water Use and Management**

#### **5.1 Introduction**

A sequence of prevailing beliefs and attitudes held by various water users and management agencies in mid-Canterbury may constrain effective implementation of water conservation policies. These beliefs and attitudes are summarised in Appendix 5. Dominant social and cultural beliefs and attitudes form the context which influences individual water use and management. Analysing the social and cultural context helps to provide some explanations for the problems occurring with implementing pricing and property rights policies. This chapter outlines the context of water use based on Ajzen and Fishbein's model. Where appropriate, interview data is supported by views expressed in newspaper articles.

#### **5.2 Social And Cultural Factors Favouring Water Conservation**

Belief in the value of water conservation is an integral part of Ngai Tahu's approach to water use and management. Traditional Maori spiritual and cultural values recognise that water has mauri.<sup>13</sup> Water is: "the promoter of all life and represents the life-blood of the environment" (Tau et al, 1990:14). Control mechanisms such as rahui and tapu have evolved to limit individual access to, and use of, particular water resources. Social controls on Ngai Tahu reserves ensure all individuals have resource rights necessary for their survival and well-being, conditional on the welfare of the larger tribal grouping. Ngai Tahu recognises that their continued tribal welfare depends on the quantity and quality of water bodies in the mid-Canterbury area being maintained "in the best possible condition" (Tau et al, 1990:19, 20).

Support for the principle of water conservation amongst Pakeha and non-Maori can be attributed to the growth of the environmental movement in New Zealand. Inglehart (in Buhrs & Bartlett, 1993:69) argues that there is a change in culture in societies which enjoy a high level of

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<sup>13</sup> Mauri translated means ethos or life force (King, 1985).



physical and material security, away from materialistic values to include concern for the environment and greater public participation in management. Favourable views on water conservation are motivated by intuition and emotion, because values or attributes of water are perceived through appeal to our moral feelings (Morton, 1986:124). Support for water conservation may reflect intrinsic valuing of the environment as having worth in its own right, or the intrinsic value of human rights such as the sanctity of life, pursuit of happiness and equitable distribution of resources. Humans ability to reflect and be self-conscious about their water use allows them to form an environmental ethic, or principles for normative behaviour, which directs behaviour through self-imposed rules (Morton, 1986:138, Parkin, 1986:151,154).

The belief in the need to conserve reflects a growing awareness of current water use as wasteful. Non-wasteful domestic practices, for example, developed in the 1930's Depression, as one domestic user stated: "...They [elderly women] don't change the dishwater [when it gets dirty], and they put it on the pot plants....now we just chuck everything down the sink....". Differences in domestic water use may be attributed to different generational values and lifestyle, a point raised by another domestic user: "...we lived in a house relying on a bore and tank so we were very conscious of how much we used". Improvements in socio-economic conditions during the 1950's and 1960's were aided by government social and economic policies to improve welfare. As one domestic user stated: "...those coming out of the Depression wanted their children to have more opportunities and material comfort than they did, but noone thought about the consequences on the environment". Improved standards of living has allowed people the opportunity to travel and make comparisons in water use. Another domestic user reflected: "...in Indonesia....you can't drink the water....we bought water that was bottled in Kaiapoi....that's when it really hits you". There are now different expectations of water use, for instance, with personal hygiene: "...there were no showers until the 1950's, now you have one every day...".

The moral rightness of using water wisely and not wasting it has contributed to support for the CCC's charging policy in principle. There is a common belief expressed by domestic users, for instance, that "individuals should pay for what they use". Favourable attitudes towards the need for some form of control over water use reflects the belief that water resources are common property and a public good. It is important to send the right signals of the cost of water: "those who wilfully waste water should be hit in the pocket" (ChCh Star, 15/2/95, News Advertiser, 20/2/95). City Council staff believe that "wasteful use of water must be reduced because excessive use by some is paid for by others". Some Ngai Tahu representatives also support the view that excessive users should have to pay. One industrial user expressed the view that: "we would expect a reasonable charge for use...it is the nation's asset...". Water metering is perceived as an effective and equitable deterrent, "if all play their part as responsible citizens" (McGregor, Press, 27/2/95). Meters have enabled some domestic users "to know how much we are using", an important starting point since few people are likely to have this information (Halkett, ChCh Star, 1/3/95).

### **5.3 Social And Cultural Factors Prejudicing Water Conservation**

The lack of strong social incentives to conserve water reflects Pakeha values of water use. Although water is essential to survival, the costs of using it are low simply because there appears to be lots of it, depending on supply and demand elasticity (Morton, 1974:124). Hence, industrial users abstracting from private bores "get it for free, so there is no problem with using it in the short term". Within Pakeha culture, land has been valued more highly than water, but as one Ngai Tahu member commented: "...land has no value if it hasn't got any water...". While the value of land is acknowledged through payment of a rate, a Ngai Tahu member highlighted the problem with valuing water use: "...there is currently no separate rate or tax for using water which reflects a commonly recognised monetary value of water". Commercial users on reticulated supplies, for instance, "pay a nominal amount to the landowner for water, so increasing the cost [of water use] would be the only incentive to conserve...its easy to waste just because its there...". Commercial water user's incentives are measured in terms of financial costs and benefits: "we're coming from a purely self-interested,

capitalistic approach, not a good citizen perspective". Within Pakeha culture, private ownership is considered an incentive to value land and water resources more highly, and adopt conservation behaviours. As one industrial user commented: "....we don't own the water, we only own the land....".

Dominant social beliefs about the adequacy of water supplies and the resource have further contributed to an unfavourable belief about adopting conservation behaviour. Such perceptions are based on a range of observations and measurements of springs in the Avon River, weather reports, rainfall levels, and in one case, the predictions of a water diviner who guaranteed a never-ending underground stream. However, there are discrepancies between the councils' data on predicted time before demand exceeds existing groundwater supplies. The CCC believes that given projected population increase, the city's groundwater supply should last until 2020, while the CRC believes the supply will run out around 2000 (CCC, 24/5/95). Although mid-Canterbury resources are perceived to be adequate because, according to the Regional Council, "the Waimakariri is hardly allocated", and "we are not at a crisis point yet", abundance may only be relevant in relation to changes in demand and effects felt in a localised area. As one commercial irrigation user commented: "....3-4 wet years in Christchurch....has taken the heat out of the issues for now". This may not be the case for tangata whenua, who have experienced shortages based on lower surface water levels in ditches, loss of mahinga kai habitat and having to put in deeper wells for potable water.

Dominant social attitudes about the value of land use activities have influenced individual's beliefs about water use. The importance of gardening, for example, was expressed by one domestic user: "....gardening is a way of life, it's very therapeutic". One farmer interviewed stated: "....we like the lifestyle and we want to stay in the area....the cashflow with dairying is better, but we'd need to put in another well....". Some commercial, industrial and irrigating users consider their activities benefit the community: "....there's the economic worth of having business - we provide jobs, income....". Unfavourable attitudes towards adopting water conservation practices reflects the higher value placed on material goods, income, and a

comfortable lifestyle. When the sum of preferential values are totalled, New Zealanders still value materialism over environmental protection (Gold & Webster, 1990:25,26 in Buhrs & Bartlett, 1993:82).

The tension between the social need to conserve and the personal need to use water contributes to the lack of a strong subjective norm, reflected in council attitudes. Water conservation is perceived as a philosophical argument by some regional council staff, expressed in the view that: "...it's not necessary but there are good reasons for doing it...". Since local government restructuring in the late 1980's, regional authorities are still coming to terms with their new mandates under the RMA. While the CRC supports efficient water use, there is a belief that: "...we can only respond to shortages as the problem arises....we cannot justify installing meters on private bores under Section 32....metering is only needed when there are restrictions, and there is public resistance to it". The Council also needs to weigh the compliance costs against the benefits: "...conservation is justifiable only in terms of reducing the costs of pumping water and the strain on sewage systems....there is no good reason for not allocating". The tension in balancing individual and social needs makes it difficult to adopt a conservation management approach, as the CRC cannot decline applications for resource consents (Mathias, Press, 16/5/95). As one commercial user stated: "...they're meant to be managing the resource, not dishing it out like driver's licences".

The lack of a strong social norm means individual attitudes regarding water use may have relatively greater weight in influencing intentions to conserve water. Domestic users, for instance, expressed uncertainty about whether changing their individual water use would have any effect on the supply: "saving on your own won't make any difference"....it needs everyone doing it....some will, some won't....only those willing to change will do so". Whether individuals intend to change their water use or not may be influenced by the availability of strategies and the capacity to act (Hines, et al, 1986/87). Some industrial, irrigation, and commercial users, for example, identified external constraints on their ability to conserve: "...the European Community has more stringent standards for potable water to be used in

washing”; “....we are price takers....we have to intensify or get out....”; “....from a guests perspective, it would be diabolical to ask for water conservation....”. An individuals knowledge of strategies and what is effective in a given situation may also influence the extent to which they conserve (Hines et al, 1986/87). An irrigation consultant interviewed referred to the attitudes of some farmers to irrigating: “....those who have an awareness [of efficient irrigation] are educated and involved with grower associations....it broadens their attitudes and exposes them to new ideas....others think that if they water lots then they can go away and don’t need to do it again for a while....this is the way Dad and Grandad did it....it worked in the past....”. Valuation studies show that New Zealanders see the need for social change but want political and economic change rather than in morals or values: “There is a strong strain of moral conservatism about personal lifestyle” (Gold & Webster, 1990:25,26 in Buhrs & Bartlett, 1993:82).

Pakeha cultural beliefs and attitudes towards water use are problematic for using allocative policy instruments such as pricing and property rights. There is a perception that the purpose of water charges is for councils to make revenue, implying council ownership of water resources. These beliefs are reflected in comments such as: “....it gets it for nothing and doesn’t have to pay storage costs....” (Morgan, Press, 25/2/95). Additionally, the beliefs that: “....it is immoral for Councils to charge for [water]....”; “....water is a gift from God” (Watson, ChCh Star, 11/2/95, Roberts, ChCh Star, 24/6/95) implies that the council does not have a right to control water use because everyone has a right to water. Charging raises moral and social issues of who has the right to use and allocate water, and the association of charging with ownership may underlie public concern that metering will lead to privatisation of the water supply (Crean, Press, 24/1/95, Mantell, Letter to Editor, Press, 22/2/95). Councillors have tried to reassure the public that “the supply belongs to the people and is for the people” (Press, 24/1/95), implying that charges relate to management rather than ownership. Nevertheless, the use of property rights mechanisms is perceived by city council staff as appropriate for the water use context, because “the Council....can only control water use to the boundary of private property”.

Maori cultural attitudes to water use may also hinder implementation of conservation policies based on charging and property rights. Ngai Tahu support abstraction policies which encourage more efficient use of water (Tau et al, 1990:20). However, they also feel the problem with water use is due to Crown mismanagement. One Ngai Tahu member stated: “....the Pakeha philosophy is to get rid of water to increase the value of land....drains have been dug deeper for flood protection but this has lowered water levels in the wetlands....”.<sup>14</sup> Loss of wetland food reserves has meant a loss of social and cultural values for Ngai Tahu communities. One iwi member stated: “loss of mahinga kai means some members can no longer practice the custom of manaakitanga, or pass on ancestry of the area from older to younger members”.<sup>15</sup> Since Ngai Tahu have already incurred these costs, some iwi members expressed concern about further costs of water use: “....now we have to spend money to retain water on the land....the regional council is the protector but they are pushing responsibility back to the community after the problem is created”. Problems with using charges and property rights arise for Ngai Tahu when they are associated with Crown ownership and management of water resources. The Treaty of Waitangi guarantees Ngai Tahu tribal ownership and management of their resources. As one Ngai Tahu member stated: “Maori have not sold off rights to water to Pakeha”.

Unfavourable attitudes to water conservation reflect the individualised nature of water use. There is some awareness of third party effects on other users, as one commercial user stated: “....[our commercial use] could have an effect on the Avon and Heathcote Rivers....”. However, in many instances water use is a private business, and strategies are not discussed between neighbours or peers. One domestic user commented that: “....water use and conservation isn’t mentioned in the garden club...”. Individual water users have different priorities according to their own needs. One industrial user commented that: “....we don’t

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<sup>14</sup> Much drainage has been done to deal with the problem of effects of deforestation and overgrazing in the high country catchment, which has contributed to flooding. Drainage has also been done in coastal areas because the dampness and lack of adequate sewerage contributed to health problems. Wetlands have been further drained to provide access to farmland, but this represents a loss of natural water storage and augmentation, because wetlands act as ponds, slow runoff and enhance recharge.

<sup>15</sup> Manaakitanga involves providing hospitality with food caught from one’s own resources.

agree with prioritising all environmental values....the Regional Council needs to decide what is the best balance for the economy....between the needs of various groups”.<sup>16</sup> Individual water use makes it difficult to establish agreed on community values for water use, as one commercial user stated: “....the CCC could say how much it values the rivers....[the CRC] needs to show the benefit here of restricting there”. The perception that third party effects are localised makes it difficult for councils to address the cumulative effects of individual use. As one Ngai Tahu member stated: “....if one room of your house is burning down, you don’t just walk away and leave the whole house to burn down....you ask what’s going on....”.

Given the context of water use and management in mid-Canterbury, pricing and property rights policies may not provide clear guidance for the community on how to value water resources or express these values in their water use. One Ngai Tahu member stated that:“....people would like to do the right thing but they don’t know how....communities may need help in deciding what sort of society they want”. Some individual users are not in a position to apply water conservation strategies. For example, a Ngai Tahu member argued that: “....eelcatchers don’t have access to council information; they are intimidated by the process, so they cannot participate in seeking solutions to the problem....”. Allocation of property rights to achieve water conservation behaviour is perceived as a lack of responsibility by governments to provide guidance. A Ngai Tahu member elaborated: “.... policymakers have enormous power to change things....to help the community provide their own vision and value of water....”.

## 5.4 Summary

There is a general perception amongst water users and managers that conservation is a socially desirable behaviour. Certain social and cultural attitudes reflecting Maori and Pakeha worldviews contribute to a favourable normative belief that individuals should conserve water. However, prevailing beliefs and attitudes about the adequacy of the supply and the benefits of individual use make the necessity of conservation questionable. Other beliefs and attitudes

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<sup>16</sup> The Rakaia River, lying south of the Waimakariri River, already has a conservation order on it to protect it from overabstraction. There may be a perception that since one braided river is protected, stricter protection of the Waimakariri is not so necessary.

about rights to use and ownership of water create problems for using allocative policy instruments such as pricing and property rights to control water use. These beliefs and attitudes form a context in which many people enjoy a relatively high standard of living, but losses are felt by tangata whenua, due to dominant practices which place greater value on land and land use activities. Restructuring of regional and local authorities has not facilitated water conservation because the private nature of individual water use and allocation results in a lack of representation of the public interest. Water conservation creates a social and moral dilemma of having to weigh up individual benefits of water use with social and environmental considerations. Moral choices about what is in the public interest must be addressed by policy and decision-makers. The next chapter discusses the political context of water conservation policy and decision-making.



## **Chapter Six**

### **Implications for Water Conservation Policy And Recommendations for Policy Improvements**

#### **6.1 Introduction**

The influence of unfavourable attitudes to water conservation discussed in the preceding chapter challenges the potential effectiveness of water conservation policies. Conservation policies are formed and implemented within political institutions. The lack of support for controls on water use reflects the influence within the policy process of powerful interest groups. It is therefore necessary to bring under scrutiny the political context of water conservation policymaking. The first part of this chapter looks at a number of constraints to achieving water conservation objectives within the political context of mid-Canterbury. Steps can be taken by management agencies to improve water conservation policy performance by considering a broader range of policy instruments. The second section of the chapter outlines suggestions for changes which could aid progress towards achieving water conservation policy objectives.

#### **6.2 Constraints on Achieving Water Conservation Objectives**

Certain criteria are useful for assessing the effectiveness of water abstraction policies. Successful implementation of water conservation policies can be measured by whether there is increased public support for policies, increased knowledge base which informs the policy, and progress made towards resolving conflict over allocation (Ingram & Schneider: 1990). To date, the CCC's charging policy has been put on hold until after local body elections, and further revision of the charging policy is expected to draw strong opposition (Mathias, Press, 24/8/95, Watson, ChCh Star, 20/9/95). Additionally, the CRC's water abstraction policy has been decided on after hearing public submissions on the RPS, and appeals on the decisions are expected due to the strong level of feeling expressed throughout the process (pers comm, C Mason, 17/11/95). Ingram & Mann (1980) propose that policy failure can occur where the policy does not match the context in which it is implemented. The level of conflict over the

CCC and CRC water use and abstraction policies highlights problems for achieving conservation objectives in a political context.

There are institutional constraints on the extent to which pricing mechanisms can achieve conservation objectives. Under the Rating Powers Act 1988 territorial councils can only charge for cost recovery, and under Section 36 of the RMA regional councils can only charge for the costs of administering water permits. This means that charges “are not directly targeted at signalling the impact of....(overuse) damages” (Sharp, 1993:5), or the social costs of losses to tangata whenua. Water supply prices charged by governments are traditionally low, “perhaps because water is considered an essential commodity”, so charges are typically just high enough to cover operating costs (Tietenberg, 1992:234). Councils need some certainty of revenue for supplying and allocating water, but a flat rate charge is socially inequitable and staggered charges are difficult to administer (Economist, 1991:54). As well as conservation objectives, councils also have obligations to provide for community development. The use of price by management agencies is problematic in that it cannot differentiate the motivation behind water conservation, in terms of which policy goals will be prioritised (Buhrs & Bartlett, 1993:77).

Conservation policies which promote controls and restrictions such as charging are not well supported amongst the voting public. One Christchurch resident expressed the view that: “Most consumers use how much or how little of water....determined by their wants, irrespective of cost” (Nesbitt-Foster, Press, 22/2/95). There is also a lack of public trust in councils’ intervention in water use, because of the statutory power and authority such agencies have (Ingram & Mann, 1980). Another elderly Christchurch resident, for example, stated: “....they’ve taken everything else away from us, we’re not going to let them take this [water]” (Watson, ChCh Star, 11/2/95). Greypower, representing the interests of the elderly, is opposed to charges, and includes an important voting sector of the population (Mathias, Press, 11/8/95). Elected councils are hesitant to enforce restrictions or charges, and the CCC has expressed its concern about “losing the public” (Press, 11/3/95). It is politically unpopular for councils to support charges which act as an incentive to control water use.

Unequal access amongst interest groups to the policymaking process, and lack of a political entrepreneur, means that water conservation is not high on the political agenda (Kingdon, 1984). The Department of Conservation, North Canterbury Fish and Game Council, environmental groups and tangata whenua have made submissions on the RPS seeking greater protection of water resources (CRC, \*\*).<sup>17</sup> However, groups who traditionally support conservation do not have the resources to contribute to all of the water abstraction policies and plans being formulated by councils (Buhrs & Bartlett, 1993:129). Ngai Tahu are underresourced to adequately respond to consultation demands placed on them under the RMA. Resistance to limits on abstractive yields and charges for water permits has primarily come from Federated Farmers groups, irrigation societies and some forestry companies (pers comm, C Mason, 17/11/95, CRC, 1994). Strong opposition to the CCC's capital-value based charging has come from residents groups in suburbs with higher property values who will pay more for their water (Mathias, Press, 11/8/95). Such groups tend to have the resources and access to avenues such as the Human Rights Commission and the Planning Tribunal, to pursue legal appeals against controls on water use. Furthermore, although the Regional Council supports water conservation, it believes contamination is a bigger problem than allocation (Crean, Press, 22/2/95). Environmental protection has a subordinate role at the regional and national level to economic and fiscal policy agendas.

The low priority given to water conservation is reflected in the lack of adequate database information and monitoring indicators to set limits on abstraction. Strategic monitoring of aquifers in the Waimakariri catchment has only been done in the last 30 years. This makes it difficult to distinguish between significant long term changes and smaller variations within norms, as well as tracing links between effects of use on water resources at different locations (CRC, 1991x:32, Knox, 1961:75,76). Variations in climatological recordings have occurred due to the proximity of shelter belts and spray irrigators near testing sites, and slanted rain gauges (Salinger, 1981, pers comm, S Larsen, 20/11/95). A lack of comprehensive metering

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<sup>17</sup> Braided rivers such as the Waimakariri are a special feature of Canterbury, and have national significance, providing habitat for indigenous flora and fauna.

of water use in the past makes it difficult for the CCC to set a correct baseline price. It is *estimated* that some farmers underuse their allocation, while amongst others there is a 40% rate of unauthorised overabstraction (pers comm, A Fenemor, 3/11/95, M Dicker, 7/7/95). The use of technical knowledge to support the case for charges and restrictions could face legal problems of uncertainty if the meaning of the data is unclear or its accuracy is questioned (Fenemor & Markham, 1994:281). There is already opposition to the CCC policy and the CRC Christchurch-West Melton groundwater management plan on the grounds of insufficient scientific data to justify charges and restrictions (Mathias, Press, 11/8/95, West Melton Residents Association, 1992).

The traditional division of water allocation and land use functions between regional and territorial councils respectively makes it difficult for councils to coordinate policies to control cross-boundary effects. The CCC has requested the CRC to limit commercial consumers from sinking bores to draw water from the Christchurch-West Melton aquifers (Mathias, Press, 16/5/95, CCC, 24/5/95). However, until the Christchurch-West Melton groundwater management plan is operative and allows restrictions to be enforced, water allocation technically continues ad hoc. Completion of regional water management plans has been deferred to give priority to the RPS, due to a lack of staff resources (pers comm, M Dicker, 7/7/95). Although the RPS requires integration between water and land use, and regional and territorial council staff meet regularly to exchange information (pers comm, C Mason, 17/11/95), there is no clear indication of how district controls on land use can be developed to be consistent with water abstraction controls. The lack of clear water conservation policy direction makes it easier for non-compliance of water abstraction to occur, because the risk of getting caught is not high (Ingram & Schneider, 1990:84, Buhrs & Bartlett, 1993:73). Although authority and responsibility for water management have been delegated to local government bodies, resources for adequate planning, monitoring and enforcement have not been devolved.

There is a lack of political will to promote water conservation objectives. The RMA requires a new way of thinking in favour of conservation management by consensus decision-making.

However, local politics tends to revolve around economic development and land use, making it relatively easy for commercial, farming and business interests to dominate water allocation decision-making (Buhrs & Bartlett, 1993:129). Since the amalgamation of Regional Water Boards and Catchment Boards, it has been suggested that internal politics have contributed to delays in plan preparation, due to differences in opinions about water management approaches (pers comm, G Roxburgh, June 1995). Conflict over values creates the potential for conservation policies to stalemate, and for no-action to be taken (Molnar & Rogers, 1982:103). The question remains whether the necessary changes will occur at a rate that will provide adequate protection of mid-Canterbury water resources for future users.

### **6.3 Recommendations for Improving Water Conservation Policies**

In order to achieve water conservation objectives, there is clearly a need to match water abstraction policies to the social and cultural context in which they are formed and implemented (Ingram & Schneider, 1990). Fenemor (1995:10) sums up the problem of water use and allocation: "Changing the perceptions of communities and industry leaders about water being a plentiful, as-of-right resource is the major challenge facing water managers". Policies and the political situation are inextricably intertwined, therefore policy content and policy tool selection needs to consider agents and targets who have authority and expertise. The onus is on the CRC and the CCC as policymakers and implementers to form policies which promote a favourable change in social attitude towards water conservation. According to Azjen and Fishbein's model (1980), policies can either try to influence some of the unfavourable beliefs towards conservation or introduce new beliefs. This should help to change individual behavioural attitudes towards more favourable views on the value of water conservation, and ultimately change water use. On the basis of the theory of reasoned action, the following recommendations are suggested to help improve water conservation policy performance.

Public support for conservation measures could be enhanced by councils giving a clearer message that they are committed to protecting water resources. The CCC is providing an example by addressing its own water use on parks and gardens, through changing irrigating

activities and using mulch (Williamson, ChCh Star, 24/6/95). However, a combined effort is needed between regional and territorial authorities to promote conservation of water resources. A joint issues and options public discussion paper prepared by a task force of representatives from various interest groups and councils would be useful at this stage. Such a document could address issues of metering private bore users within the city and around the periphery; metering other ground and surface water abstracters within the Waimakariri River catchment; funding for storage and augmentation methods such as raintanks, grey water recycling systems, weirs and aquifer recharge options; and ways of alleviating the costs of charging on low-income families (Ashton, Rutherford, ChCh Star, 1/3/95).<sup>18</sup> Council publicity and action on activities such as fixing leaks would help to show the public that water conservation must be taken seriously.

Further data linking water use and effects could help to encourage a change in individual beliefs about the abundance of water resources and the effects of overuse. The CRC acknowledges that abstraction from groundwater wells in the whole of the plains and the catchment affects stream flows in the area (pers comm, C Mason, 17/11/95). However, before implementing charges and restrictions, the CRC and CCC firstly need to identify the resource, and the interactions between various users and interests groups (pers comm, M Dicker, 7/7/95). Coordinated hydrological and climatological monitoring, involving joint funding and sharing of information between agencies, could help to improve accuracy of forecasting. Informal data on effects on other users can be gathered from individuals experiences and observations, and such knowledge should be treated by councils as equally valid alongside technical information (Molnar & Rogers, 1982:104). Ngai Tahu have a significant body of knowledge about local water resources developed over a long period of relating closely with the natural environment, and such knowledge could be useful for building a picture of changes to the resource. Although information gathering, monitoring and employing staff with the appropriate expertise is costly for councils (OECD, 1987), investing in research can provide benefits of improved agency

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<sup>18</sup> Waitakere City Council prepared a public discussion document prior to introducing controls on water use (Ashton, ChCh Star, 1/3/95).

performance through more effectively meeting conservation objectives (Ingram & Schneider, 1990:83).

Social acceptance of controls and restrictions on water use may be facilitated by councils considering a broader range of policy tools. There has been much criticism of the CCC for not providing clearer information or doing prior public liaison about the proposed policy (North West Herald, 4/2/95, Press, 13/3/95, Keene, Press, 5/4/95, Anderton, 12/3/95). Feedback on the CCC charging policy indicates there is public interest in alternative policy approaches such as education on drought-resistant plants, research into conservation systems used elsewhere, and separate metering of all properties (Shirley/Papanui Community Board, 2/8/95, ChCh Mail, 10/8/95). Additionally, the CRC has been advised to prioritise funding in its annual budget for education and research into conservation methods such as irrigation scheduling and recycling technologies, because raising user awareness and promoting efficient water use “needs to work hand in glove with regulatory methods” (pers comm, C Mason, 17/11/95, Davie, Lovell-Smith et al, 1994: 56). Economic principles used in policies and decision-making may be confusing to the general public. Further education could help explain the need for controls and restrictions to protect the public and resources from the cumulative adverse effects of individual use and free-riders.

Integrating a range of values and interests in water use could be enhanced by better use of community boards, water user groups and iwi-based structures. Such groups are a useful mechanism for disseminating information and encouraging cooperation (pers comm, A Fenemor, 3/11/95, Yates & Daly, 1994: 287), and there is already provision for their use in the CRC’s RPS and legislation. Community-based systems of management and decision-making are appropriate to a bicultural context, and would allow Ngai Tahu iwi and hapu to have tribal ownership and stewardship of their resources recognised. Creating an environment of negotiation could facilitate discussion and education about how best to share scarce water resources. “Management by political consensus rather than marketplace confrontation may provide a far more efficient (in terms of structural requirements) and socially acceptable

outcome when allocating a water resource” (Yates & Daly, 1994:287). Improving communication between agencies and water users may also avoid costly court battles where better resources groups are advantaged.

These recommendations are aimed specifically at the situation of water management in mid-Canterbury. However, since water conservation policy in mid-Canterbury is constrained by the national context, greater support for water conservation objectives would be helpful at the national level to draw attention to the issue. The Ministry for the Environment could further support regional and territorial water conservation initiatives by exploring water audits, for instance, as an incentive for industry to reduce waste and be more efficient. Identifying incentives to conserve could involve highlighting the benefits to business of maintaining a green image (Grant, 1991:39). Amendments to legislation such as the Building Act, to allow councils to legally require water-saving devices to be installed in buildings, could also be explored (Fitzsimons, 12/3/95). While it is acknowledged that the Ministry has limited resources, their support would send a positive signal to local bodies of the importance of conserving valuable water resources.

#### **6.4 Summary**

The issues facing water abstraction managers in mid-Canterbury provides a good example of the problems with forming and implementing water conservation policies in a political context. Lack of support for water conservation policies raises questions of whether pricing and property rights mechanisms will be able to achieve multiple ecological, economic and social goals. Groups with conservation interests have limited input into the policymaking process, and are competing against other interest groups with better access and resources to influence decision-makers. Limits to the accuracy of scientific data create problems for using it to set abstractive limits. Additionally, traditional institutional divisions between regional and territorial authorities limits their ability to act in a coordinated way to monitor resource use, enforce restrictions and incorporate the public interest into decision-making. Notwithstanding legal constraints, the performance of the CCC and CRC policies could be improved if both



agencies showed greater commitment to achieving conservation objectives. Strengthening informational and educational mechanisms may help to change social attitudes towards more favourable support for controls on water use. Using community-based groups to address water use and allocation issues will enable councils to integrate a range of values and interests in water use, and allow councils to fulfil their statutory obligations regarding Ngai Tahu concerns. For policies to be effective, comprehensive water conservation initiatives must be promoted at both the national and local level.

## **Chapter Seven**

### **Conclusions**

Water conservation is a complex issue in New Zealand. As has been shown in this study, uncertainty about physical limits and variability of the resource makes it difficult to anticipate how much water will be available for future use. There are a range of water users and groups with different interests in the resource, whose needs must be considered when allocating scarce resources. It is difficult to weigh up the costs and benefits of controlling water use. There are a range of beliefs and attitudes about how much we need to conserve. Water conservation policies must be developed which are socially and politically acceptable, as public support is vital for effective implementation. As well as taking these factors into account, policymakers must work within the limitations of the RMA to achieve water conservation objectives.

This study indicates that pricing could be a useful policy tool for achieving water conservation. Charging for water use raises awareness of the need to value scarce water resources more highly, and could facilitate a change in attitude to water use, in favour of the need to adopt conservation behaviours. However, there are some reservations with using pricing and property rights as policy tools. There is a lot of uncertainty about what is the right price to charge for water use. Charging for water might not achieve the anticipated reduction in water consumption. Human behaviour is not always rational, making it difficult to predict how people will respond to pricing and property rights mechanisms to control water use.

Uncertainty about responses to controls on water use makes it difficult for policymakers to choose appropriate and effective policy tools. Setting minimum flows is a positive step towards protecting ecological and tangata whenua values. However, allocating water above minimum flows amongst competing users involves making tough social and moral choices. Charging for water use is socially and culturally offensive to some members of society, and using pricing could be perceived as a way for councils to avoid making difficult decisions. Pricing raises issues of ownership and rights to water resources, particularly regarding tangata

whenua ownership of water resources under the Treaty of Waitangi. Whatever allocation decisions councils make, they will run the risk of losing political support from interest groups adversely affected.

Water use in New Zealand may not change unless existing beliefs and attitudes which influence water use are first addressed. The theory of reasoned action has been useful for identifying influences on beliefs and attitudes toward water use and management in the mid-Canterbury area. It is proposed that the social context of water use and management is one where dominant beliefs about an adequate water supply and an implicit right to use water, combined with attitudes about the individual benefits of water use, outweigh or override subjective beliefs about the value of conserving water. Moreover, cultural beliefs that water charges imply resource ownership creates further resistance to the use of pricing and property rights mechanisms to achieve water conservation. Dominant social and cultural beliefs and attitudes about water use and management are a key problem for water managers to deal with in the 1990's.

The findings of this study are by no means conclusive. Beliefs and attitudes are subjective, and it is not so easy to draw concrete conclusions from subjective data. The theory of reasoned action gives no means of identifying the strength of beliefs and attitudes which influence water use, so it is uncertain exactly what is the level of support and opposition for water conservation policies. People may be more conservation-minded than what this study suggests. There are, no doubt, other influences on people's water use that this project has not covered or has only touched on. Given the influence of local contextual factors, the findings of this study may not apply to other water use situations in New Zealand.

Further social research on beliefs and attitudes about water use and conservation would be useful to anticipate responses to conservation policies. Quantitative research could assess the degree of support for pricing and property rights mechanisms. This would help to set a baseline for future comparison of behavioural changes in response to conservation policy

implementation. There may also be value in doing research to explore how much influence demographic factors such as age and socioeconomic status have on water use.

Nevertheless, the dominant social and cultural beliefs and attitudes identified in this study are relatable to the broader New Zealand context. Much of New Zealand society is structured around individual property rights, which are the norm for Pakeha. However, this does not mean they will be adequate policy tools where community-based decision-making about common property water resources is appropriate and desirable. There may be problems for councils trying to implement water conservation policies if water managers do not consider different but equally valid management approaches. Safeguarding valuable water resources as an investment for the future requires political will, communication and cooperation. Community-based groups can be a viable means of changing attitudes and encouraging communities to accept the need for controls on water use, as a means of achieving water conservation.

## **Epilogue**

The tap still leaks, at the rate of 10 litres a day. However, on the basis of what I have learnt from doing this study, I now put a bucket under the tap and pour the water on the garden. It makes more sense to me to put the water on the land, rather than letting it go down the plughole and out to sea.

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## **Glossary of Abbreviations**

RMA: Resource Management Act 1991.

CCC: Christchurch City Council.

WSCA: Water and Soil Conservation Act 1967.

NWSCA: National Water and Soil Conservation Authority.

TCPA: Town and Country Planning Act 1977.

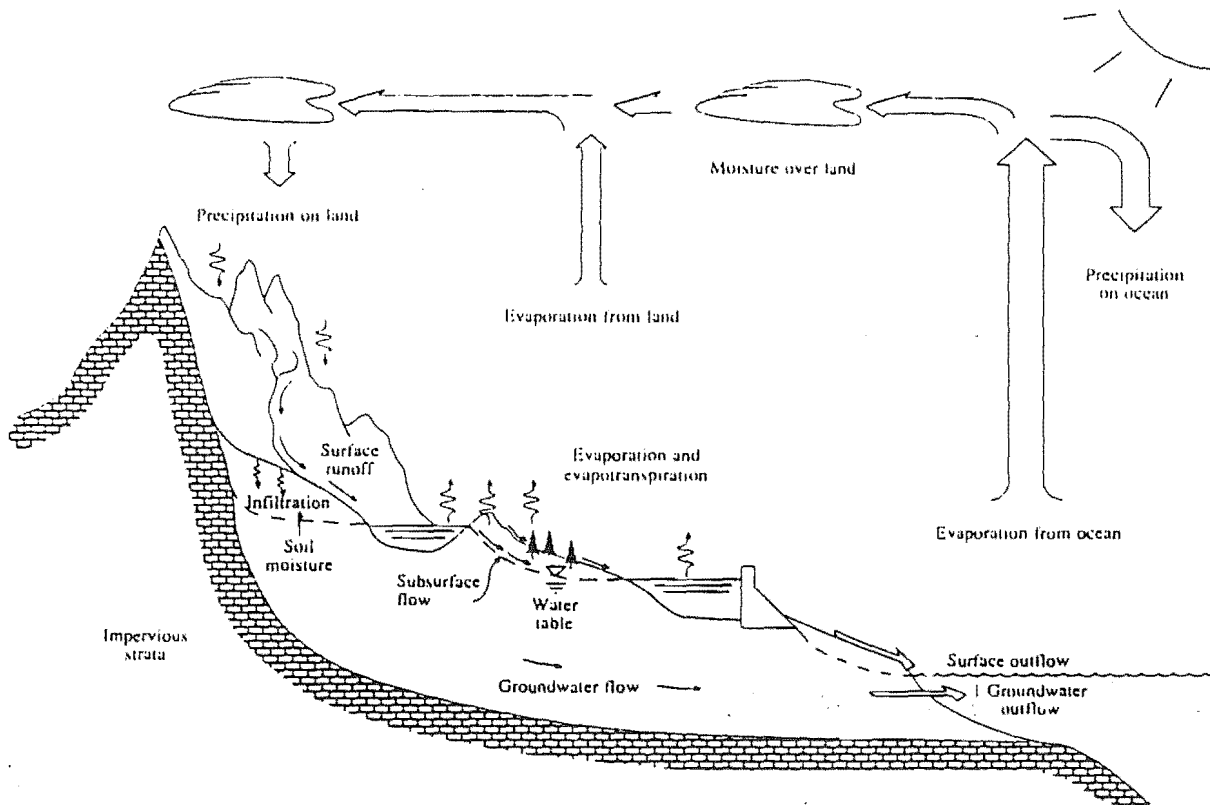
LGA: Local Government Act 1989.

MFE: Ministry for the Environment.

OECD: Organisation for Economic Co-Operation and Development.

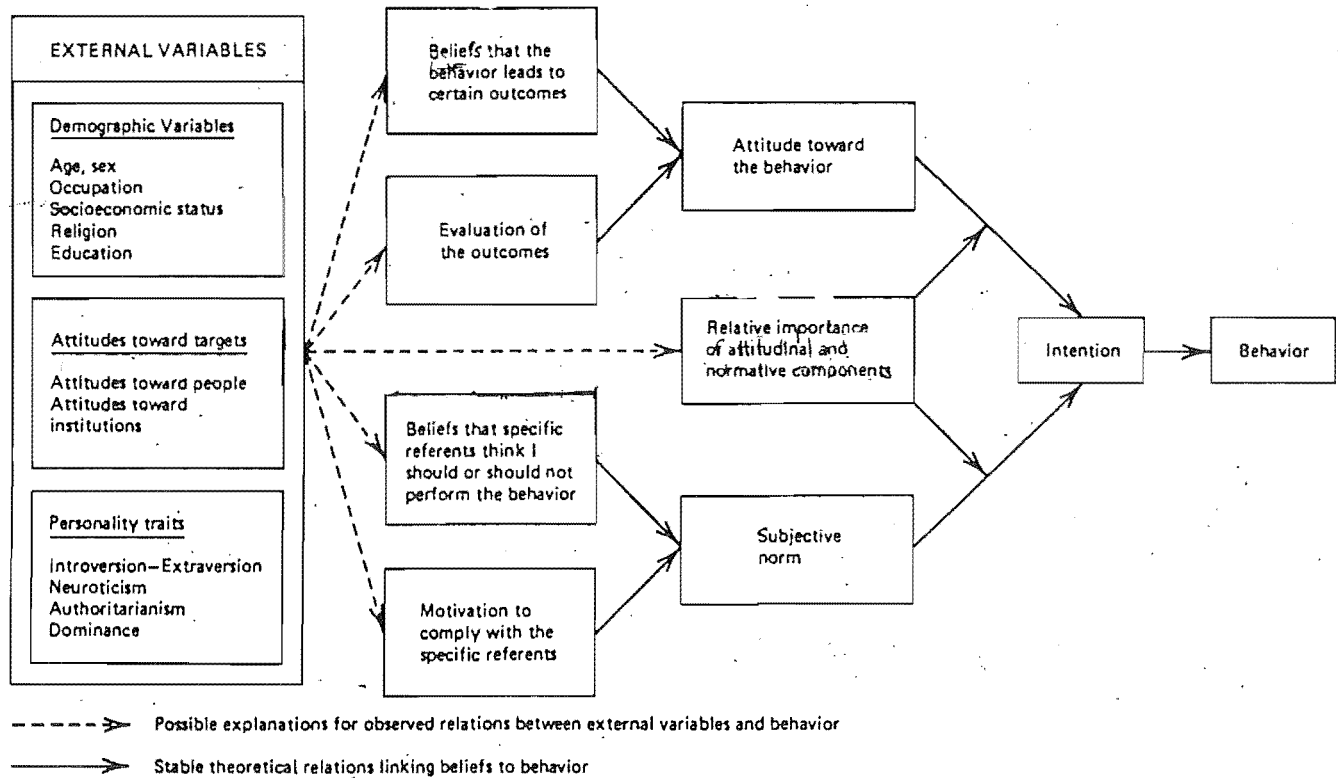
RPS: Regional Policy Statement (for the Canterbury region).

## Appendix 1: The Hydrological Cycle



Source: RESM 601 Handout, 18/7/95.  
 Centre for Resource Management, Lincoln University, Christchurch.

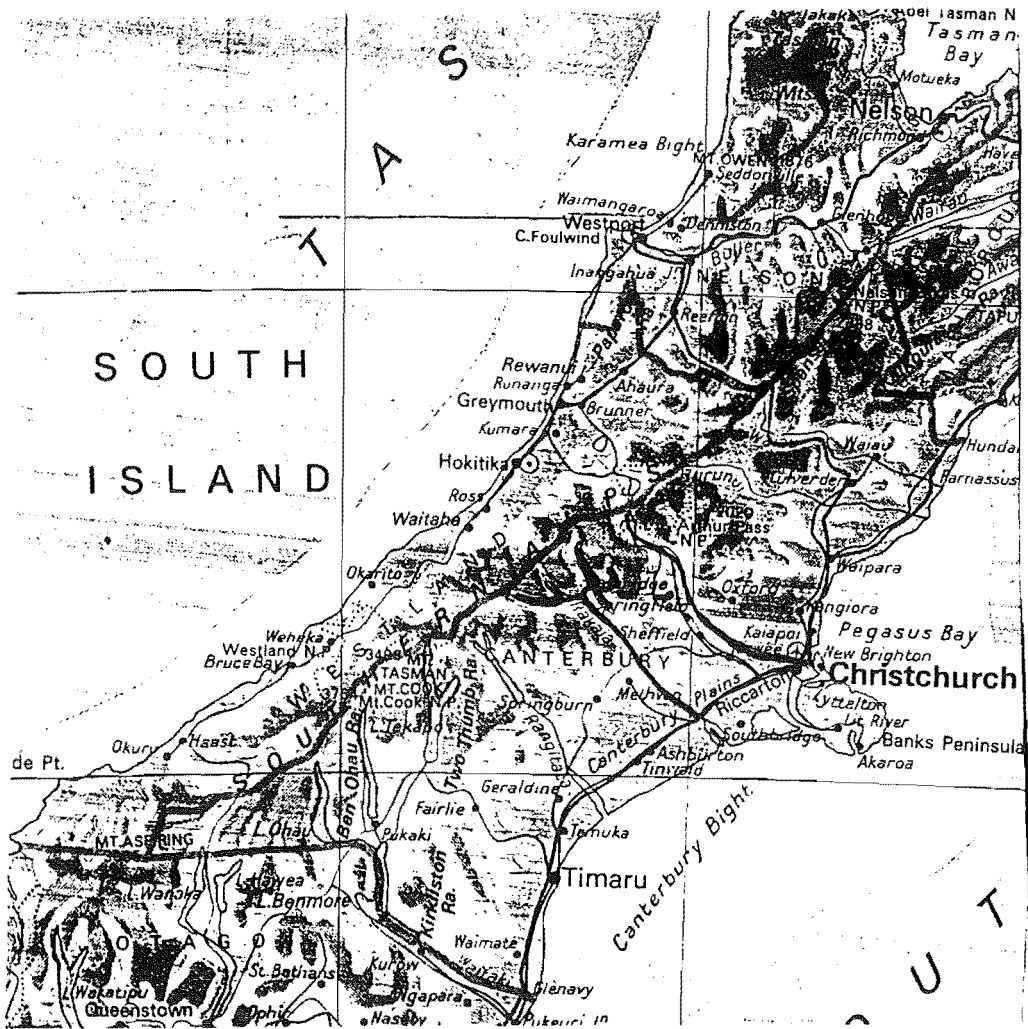
## Appendix 2: A Model of The Theory of Reasoned Action



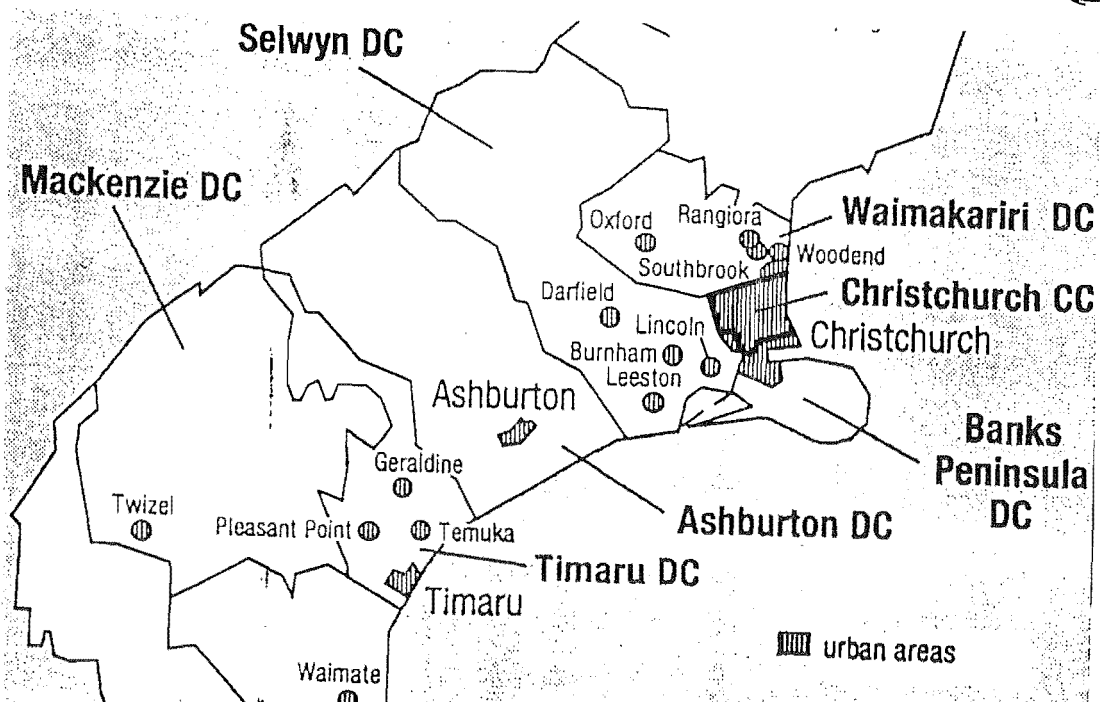
Indirect effects of external variables on behavior.



### Appendix 3: Maps of the mid-Canterbury Area.



Terrestrial Local Authorities & Urban Areas  
(1991 Census)



## Appendix 4: Sample of Water Users and Managers Interviewed, and Interview Questions.

### Sample

Water users and managers were interviewed as representatives of the following interest groups:

Housewife - domestic water user.

Superannuitant - domestic gardening water user.

Hotel operator - commercial user.

Primary processing manager - industrial user.

Orchardist - commercial irrigator.

Farmer - irrigator.

Ngai Tahu member - iwi perspective, irrigator.

Ngai Tahu Trust Board member - iwi management perspective.

Policymaker - Christchurch City Council.

Policymaker - Canterbury Regional Council.

### Interview Questions

The following questions were asked:

1. What specific sort of activities do you use water for?

This question was asked as an introductory question.

2. How adequate, do you think, will the water supply be to meet these future needs?

This question was asked to ascertain peoples beliefs about the resource and water use, and what information they are basing their views on.

3. What will future water shortages mean for you?

This question was asked to ascertain attitudes about water use in relation to future increased demand.

4.

How do you intend to meet your future needs for water?

This question was asked to ascertain peoples intentions about conserving water. This is different to what people want to do, think they should do.

5. What changes, if any, have you already made to your water use activities?

This question was asked to avoid the assumption that people had not already made any behavioural changes with their water use.

6. What effect will changing your water use activities have on the water supply?

This question was asked to see what outcomes people identified as a result of changed, planned change or no change in water use, and whether these outcomes are likely to be positive or negative.

### Appendix 5: Summary of Interview Responses.

	Beliefs About Water Use	Attitudes To Conserving	Intentions	Behaviour
Domestic Users	<p>We are real wasters; we haven't had to think about it.</p> <p>We use more now. We've learnt not to waste from past experience.</p>	<p>Metering will help us conserve. It's a personal choice.</p> <p>Individuals should pay for what they use. Still need a tidy house and property; we could use the old well.</p>	<p>Will get a rain tank if we go over the limit.</p> <p>Will stop watering the Councils lawn if we have to pay.</p>	<p>Already change gardening use, put limits on the kids' use.</p> <p>Already monitoring use use the waste disposal less.</p>
Commercial User	<p>Water use is not a problem, without being fully informed.</p>	<p>We are purely, self-interested capitalists, not good citizens. Cost would be the only incentive to conserve.</p>	<p>If the price goes up we will have to think about conserving.</p>	<p>Changed garde irrigating to be more efficient.</p>
Industrial User	<p>We are aware of the limits and the need to conserve. Not a problem in the short term - we're minimising impacts.</p>	<p>More technology is costly. We are constrained by external regulations. The CRC must decide the balance of use and conservation.</p>	<p>We would have to relocate if the conservation costs are too high.</p>	<p>Ongoing policy of replumbing. Commissioned hydrological report.</p>
Irrigator	<p>Need to be cautious, but not a problem if its managed properly. We take a scientific approach; we don't waste it. Our use benefits the community.</p>	<p>Those who put it to best use should have access in shortages. The CRC should put more effort into understanding effects of use.</p>	<p>Lobby the CRC about restrictions and tradeable permits.</p>	<p>Put in deeper bores; do soil moisture tests. Put water mete on property. Changed irrigation use.</p>
Farmer	<p>See no reason why we should run out. We are in a wetter phase now. We use it wisely but not to the point of not growing crops.</p>	<p>We have to intensify or get out. We like the lifestyle, and want to stay in the area.</p>	<p>Will put in a second well. Considering planting shelterbelts.</p>	<p>Used irrigation consultant. Changed irrigation equipment.</p>

	<b>Beliefs About Water Use</b>	<b>Attitudes To Conserving</b>	<b>Intentions</b>	<b>Behaviour</b>
Iwi water user perspective	Ngai Tahu preserved water for mahinga kai. Need to keep water on land.	Council should take responsibility. Need to educate people, have a water rate.	Will put weirs in to flood own land.	Already put well down deeper.
Iwi management perspective	People want to do the right thing but don't know how.	Councils have a community responsibility; they need to guide the community.	Depends on what the community wants, how they value the resource.	Made submissions on the RPS.
CCC policymaker	There is not a water crisis. Tanks are too expensive. Excessive use by some is paid for by all.	Our goal is efficiency, to reduce the costs of installing new reticulation system.	Target peak demand. Reduce waste.	Promote charging policy
CRC	There is no pressing need to conserve, but are good reasons for doing so. The Waimakariri is hardly allocated. It will take a crisis before people will change.	We have to protect existing users and ecological values. Meters are only needed when restrictions occur.	Will include limits in plans if required.	Monitoring flows, categorising permit holders. Looking for incentives.